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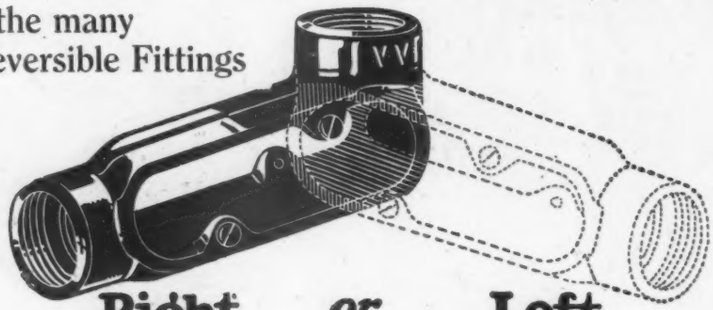

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WHERE THE GOVERNMENT WILL SPEND A HUNDRED MILLION DOLLARS

The recommendation of the Naval Board establishing a naval base at the Alameda site on San Francisco Bay means the bringing of a tremendous industrial activity to the Pacific Coast. It is estimated that 15,000 men will be employed in these yards in the various occupations of repairing, victualing, munitioning and placing supplies aboard the Pacific fleet. The plans outlined by the board involve an eventual outlay of some $100,000,000 for piers, dry docks, warehouses, foundries and other equipment, work to begin upon the vast project immediately following action by Congress. The site is an ideal one for this great government enterprise, being located on the deepest water of San Francisco Bay with excellent land transportation facilities, three transcontinental railroads having their western terminus near by. The great interconnected electric systems of northern California which center in the bay region will make possible a varied service of electricity in all departments of the work. When completed this will be the largest naval base in the world.

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Journal of Electricity and Western Industry

A publication devoted to the upbuilding of the great industrial West and the countries bordering on the Pacific

A McGraw-Hill Publication

Interpreting Western progress through the application of electric power, light, and heat in industry and in the home

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A BILLION DOLLAR BANQUET

IT is difficult indeed to reckon the far-reaching effect which the symposium devoted to the upbuilding of the West, held on the evening of February first at the Palace Hotel in San Francisco, commemorative of the thirty-fifth anniversary of the Journal of Electricity, will have upon industry throughout the West. That there were men in the audience who have been subscribers to the Journal of Electricity for many years whose signatures in sum total during the next decade are destined to be placed upon appropriations for expenditures for electrical equipment amounting to one billion dollars, is indeed complimentary to the efforts of this Journal in its work of upbuilding the West. But while we are deeply appreciative of this compliment to the editorial vision of Journal of Electricity and Western Industry, we cannot help but feel that the good that will result from the powerful discussions that were brought out on this particular evening looking toward the betterment of the West and by the disseminating of helpful information to the public generally, will far outweigh any other consideration.

On other pages of this issue of Journal of Electricity and Western Industry are set forth in full these matters, as well as a list of the bankers, industrial men, educators, research engineers, and financiers who were gathered at this symposium, representing practically every phase of the business and industrial development of the West.

There is a big work for all of us to do in the immediate years ahead, and on leaders of the electrical industry — an industry in the West upon whose development all other industry and progress depend — there devolves a deep responsibility. We hold in our hands the destiny of a vast empire in the making, and well may we ponder in serious contemplation our acts of today in order that those who succeed us tomorrow may call us blessed. With the magnificent vision of helpfulness to the West established at this symposium held constantly in view, it is safe to say that generations to come will call to mind this billion dollar banquet as the beginning of an era wherein the natural resources of an empire were harnessed and put to useful purpose in an expeditious, efficient and helpful manner for the highest good of its citizens.

California's Corporation Tax Bill

The King tax bill, which was defeated by a narrow margin at the last session of the California State Legislature and which will be re-introduced at the next session, is perhaps the least understood and most malignant piece of law which has been presented to the people of that state for some time. For not only is the bill unfair but the reasoning by which the tax rate of the corporations was determined is decidedly illogical.

In view of the fact that capital is like a bird seeking some place to alight and that the least disturbance will frighten it away, and considering that over seven hundred and fifty million dollars will be needed in the West in the next ten years for hydroelectric development, Journal of Electricity and Western Industry believes that if the provisions of this bill are carried out there will be considerable disturbance which will scare capital far away from the Western coast.

In brief, this bill proposes an increase of about thirty-five per cent over the rate of 1916, which would of course add thirty-five per cent to the taxes of the corporations whose tax rate is fixed as a certain percentage of their gross revenue. Because general property in California has increased thirty-five per cent in value in the past five years, there is no reasonable basis for the supposition that therefore the value of a corporation has increased in any such proportion. The gross revenue which a corporation receives has no direct bearing upon its net revenue or the cash value of its property. The only fair way to increase the tax rate of these corporations would be to determine the cash value of their properties or approximate it by taking the value of their securities and figure out from that valuation the proper tax rate they should be required to pay.

As an instance of what the corporations are actually paying at the present time as compared with the general property tax of $1.63 paid by the citizens

of the state, the following figures may be of interest: railroads, $1.94, light and power companies, $1.82, and telephone companies, $1.77. To increase these taxes by thirty-five per cent in the manner proposed would not only be unfair but would throttle industry in the West. All business houses, industrial plants and others believing in sound business principles are at this time cutting down on expenses, but our governments are indulging in a wild orgy of new extravagances and it is proposed to add to a budget already too large, about fifteen million dollars which the corporations are asked to pay.

Devoted to the upbuilding of the West as it is, Journal of Electricity and Western Industry feels that this bill will harm the industries already established in the West, and will have the effect of keeping not only new industries but also new capital from entering the state of California, and so believes that this piece of legislation should again be voted down when it is brought up for passage in the California State Legislature.

The Cooperative Campaign and Illumination

The objects of the California Electrical Cooperative Campaign, and other similar institutions throughout the West, have been to further better service to the public by the more intelligent sale of (a) Electrical Merchandising and Wiring, (b) Energy, and (c) Securities. All these are recognized as being interdependent.

The Cooperative Campaign has been heretofore rightly concentrating much of its attention in helping the merchandising and wiring branch of the business to function better. The contractor-dealer has been helped to better business and accounting methods.

It is equally important, if the best service is to be given the consuming public, and if electricity is to find its widest use, that the contractors and dealers and their employes who are in direct touch with the public be sufficiently posted technically to sell the public what it should have.

Lighting still remains one of the most important parts of the electrical business. There is an immense field not only for the improvement of industrial lighting but for improvement and remodeling of home lighting. The contractor-dealers' recommendations or suggestions determine what kind and quantity of lighting goes into industrial plants, stores and homes in the great majority of cases. Power company solicitors also influence a certain number of installations.

The Cooperative Campaign idea can render a further important service to the industry and to its members by helping the contractor-dealers and other electrical men of the state to a better knowledge of illumination and to a better knowledge of how to sell it to the consuming public. This in turn will result in better lighting service to the public in new buildings and in additional business from the equipping of old unsatisfactory installations.

Campaigns for more outlets cannot be effective unless the owner or architect can be shown just why and for what probable purposes more outlets are needed, and to do this the contractor-dealer and all salesmen meeting the customers must have sufficient technical knowledge to present convincing arguments.

To carry this out is a matter of education within the industry, just as in the former work of the Cooperative Campaign. An illumination specialist in the employ of the Campaign could work in the following ways:

1. By direct field work; that is, by visiting contractor-dealers and teaching correct principles in planning lighting installation and displaying lighting goods, and giving the contractor suggestions as to how to present the matter of improved lighting to his customers.
2. By educational talks to jobber salesmen and central station solicitors who come in contact with the contractor-dealers and with the public.
3. By industrial and home lighting demonstrations at the larger centers.
4. By articles in the local papers.

Conditions are becoming more favorable than ever for selling better lighting to the public. The merchandising and manufacturing methods in lighting fixtures and appliances are in the midst of a change. Portables and ready-to-hang fixtures are on the increase. This makes it easier for the local contractor-dealer to be even more of a factor in the business than ever before. Contractor-dealers of this locality have already made a good start in better merchandising methods, better accounting, and attractive displays. The next logical step would seem to be more educational work on the merchandising of lighting as distinct from the mere display of appliances.

Surely the West, so progressive in all matters pertaining to better service to the public, cannot longer overlook greater emphasis on better illumination.

The Inman Investigating Committee

The great need of the hour is for a more comprehensive grasp on the part of the public concerning the great utility problems of the present day. There are few men in the street who really grasp what hydroelectric development, for instance, means to the West; few who realize that the home, the city, the industry and the very life of the West is inseparably bound up with the harnessing of our water powers. Such being the state of affairs in the mind of the general public, it is now generally recognized that the investigating of public utility bodies, such as the California Railroad Commission, for instance, is a godsend to the people, and as a consequence we commend Mr. Inman for having initiated this splendid constructive work.

Never before have the people realized how intricately their welfare is bound up in the welfare of this great basic industry. The housewife, the farmer, the home builder and the business man have each gained a new conception through the presentation at these hearings of what electrical development is doing for California, and it is with full faith in the integrity and vision of these investigators that the Journal of Electricity and Western Industry feels

called upon to commend their work; likewise, with this full assurance we look forward expectantly to this committee's not only reporting to the legislative body of the state of California that all suspicions have been cleared away, but that it will in no uncertain terms come out fully, emphatically and wholeheartedly in its endorsement of the magnificent work that has been carried on in California in the development of its utility ideals.

Extension to Power Company Lines

The question of extensions has always been one that has caused the power companies to be misunderstood, for the average consumer cannot realize the expense the company incurs in constructing an extension and maintaining it. Almost every power company has different ideas as to the proportion of expense that should be borne by the consumer, and the rate at which he should pay back his proportion of the expense. Very few public service commissions have attempted to solve this problem, but the Wisconsin Commission has recently issued an order covering the question of extensions, which contains some interesting features.

In order to gain a better understanding of the problems involved, the Northwest Electric Light and Power Association has sent a questionnaire to its member companies and other large electric utilities in the country. When the results of this questionnaire are tabulated it is hoped that a solution or at least some of the problems of extensions will be apparent, and that the association will be able to draft model rules which will be fair to both the power companies and the consumers. These can then be offered to the regulatory bodies of the various states to aid them in formulating an order which will solve this troublesome question of extensions.

This work should be followed by all members of the electrical industry, and the central stations of the West should give all possible assistance to the Northwest association. For if a means can be found further to electrify the West without putting an undue strain upon either power company or consumer, it will mean a larger sale of appliances and a more widely spread appreciation of the usefulness of electricity.

Another Opportunity for Cooperation

Since the West has become famous for its various cooperative movements, not only in the electrical industry, but in all forms of industry, it is fitting that it should welcome a chance to do some more cooperative work the results of which will be far-reaching and of benefit to all of this section of the country. The United States Geological Survey is charged with the keeping of the records of stream flow and other hydrometric data. The funds for carrying on this work are limited, and consequently the work is not carried out as fully as it should be. The power companies are dependent upon the records of the U. S. G. S. regarding the stream flow when they plan a new project, and unless these records are complete they lose their value and are often misleading.

In the case of a power company starting a development and figuring on a certain amount of water, there is a good chance of overdevelopment unless the records are reliable and extend over a sufficient length of time to show the cycle of wet and dry years. If the company does overdevelop, and is allowed to charge rates based upon capital invested, which is only right, then the consumer has to pay for this overdevelopment. To overcome this the U. S. G. S. should be allowed more money to carry on their work properly. The power companies should cooperate with the U. S. G. S. in every way possible to protect themselves and their consumers, and the Western States, being the most vitally interested, should make a determined effort to get the amount of money set aside for this work increased.

Broad Action in Water Power Development

The recent national legislative action at Washington whereby water power located upon the public domain may be appropriated and acquired with reasonable security of investment is greatly facilitating the development of the West, and yet it now appears that state action is necessary in a number of notable cases in order that water power development may proceed in a harmonious coordination in each state. Take California as an example. Here we find various types of development of water power. In certain parts of the state, for instance, it is found that the water power lies up in the high levels of the mountains, with irrigation systems in the valleys below. In other instances the water power development and irrigation are practically on the same level, whereas in a few other instances the irrigation system is located on one level with the water power development far below the irrigated area. Since the season of the year in which water is necessary for irrigation does not correspond in all instances with those seasons in which water power is needed most, it is readily seen that various conflicts arise, and indeed at the present time in many states throughout the West there is a definite conflict in the grouping of interests involved.

In the Journal of Electricity of November 15, 1920, forceful comment was made on the proposed Marshall bill that will appear before the next state legislature in California, and at that time editorial favor was given in no uncertain terms to the appointment of a committee with a broad and representative membership, including a power man, a member of the railroad commission, a member of the water commission, a member of the farmers' association, a representative of irrigation districts and of every other interest involved. The passing days only serve to emphasize the necessity of such broad action. The Journal of Electricity, as a consequence, emphasizes with all its power the necessity for this broad action in all the commonwealths of the West.

The Code of Ethics Abroad

It is interesting to note how members of foreign engineering societies respect almost to the point of reverence the code of ethics instituted by their respective societies. This is well illustrated by a recent occurrence. A foreign engineer had been asked to permit his name to appear in the Directory of Consulting Engineers, published at the end of the year book of one of our well-known American engineering societies. The engineer in question, who was one of the most distinguished figures in engineering life, wrote that he would be unable to allow his name to appear, owing to a ruling of the Council of the Institution of Civil Engineers in London that such an insertion even in America would be a business advertisement which is barred to members of the institution. While this incident perhaps would not appeal to the ethical turn of mind in America as somethnig involving a principle of right or wrong, yet it shows how fine it is to have an established policy, and how engineers generally respect its demands.

More and more, engineers are coming to the realization that broad principles of ethics established for the betterment of the profession and for service to the public in general will do much toward creating an esprit de corps and a tradition in this profession that will prove helpful beyond words. It is to be hoped that the year 1921 will see real progress in the establishment of codes of ethics in the various engineering societies, or, better, the establishment of general fundamental principles of engineering ethics on which the individual societies may build.

Power Development and the Public

While it is realized that the public has no conception of the money necessary to carry on a power development, and of the fact that there are a large number of expenses which do not show up after the job has been completed, only a few of the power companies are doing anything to educate the public along these lines. A few of the Western power companies that are carrying on big developments are taking moving pictures of the work that they are doing, and intend to use these to show the investing public where their money goes.

The Washington Water Power Company is carrying on a power development in its own front yard in the heart of the city of Spokane. By proper advertising and publicity there is a wonderful chance for that company to educate its consumers not only in the matter of construction costs, but to the fact that it is developing ahead of the needs of the community so that additional industry may come to that vicinity and be assured of power at once. The power companies have been left no privacy in the matter of construction and other costs, and the company could well afford to let the public realize the proportion of the money that is to be spent in that vicinity, and so gain the good will of its consumers. If a company has a right to include good will as a part of its tangible assets, then it should also include ill will among its liabilities, and make a greater effort to convert the will of the consumer into an asset by bringing him to the realization of what the construction work of the company means to the community in dollars and cents.

The West and Conditions in Europe

When will foreign exchange improve; and will Germany come through in the payment of her indebtedness? These are questions that confound inquiring individuals, for no one has the wisdom to answer with full assurance. It is quite well realized today that the Germans must find partnership with British and American firms if they are to have a chance of winning back again their lost prestige in world trade, and it is well that a reasonable entre be given them, for only under such conditions can we hope to build a regenerated, revitalized Germany. If we are to have a new and revitalized world we must revitalize those parts of a sick world which need treatment the most.

To answer, however, the profound question of when exchange will improve, we may say that exchange will improve when two things are brought about; namely, when American banking interests are organized so as to extend long time credit for foreign enterprises, and when the American investing public decides that it is willing and glad to invest in foreign markets. Then and then alone will the great upheaval and unbalance in world exchange conditions begin to right themselves.

The West, with its possibilities of building a commercial empire of the Pacific, participated in by all the great and growing countries lining its shores and constituting two-thirds the peoples of the earth, may with profit ponder on these fundamental questions of credit granting and foreign investment.

The Breaking of Insulators

An insulator broken by an amateur marksman near Vancouver, B. C., recently put a whole system out of commission. Originally insulators were made of white porcelain, but they provided such excellent targets for ambitious Nimrods when the game was scarce, that they had to be given a protective coloring. The neutral brown glaze of more recent types makes them both less tempting and less easy to hit.

Since most insulator trouble is due to insulators being broken by small boys with a desire to improve their pitching arm or by amateur hunters seeking to improve their aim, the power companies could well afford some educational advertising explaining the damage done by the breaking of one insulator, valued at, say, two and a half dollars. Play it up in a series of short dramatic sketches applying the self-interest idea. For instance, a small boy throws a stone at an insulator on the high tension line and breaks it. A day's work in an industrial plant is spoilt when the sudden cessation of power prevents metal being poured at the right time.

This type of advertising might be carried on long enough to convince the public of their depend-

ence upon those insulators, and of the fact that they are doing the same damage to their community by breaking one of them as they would be doing by derailing a train load of coal.

Recent Advances in Electro-Magnetic Theory

Journal of Electricity contributed a powerful discussion to the present status of the electro-magnetic theory in the articles on "The New Physics" that appeared serially for some months last year, under the authorship of Albert C. Crehore, the well-known physicist. Since these discussions were followed by a large group of readers of Journal of Electricity and Western Industry, it will be interesting to set forth a few recent developments in the electro-magnetic theory touched upon in Dr. Crehore's several different articles.

In this series of articles, the author made one or two references to the new electro-magnetic theory of Maga Nad Saha of Calcutta, India, which has been the subject of some of his most recent investigations. It will be interesting to our readers to know that in his research activities Dr. Crehore has been able to derive the gravitational equation directly from this new theory without the necessity of modifying it, whereas using the Larmor-Lorentz theory, as in both of his recent books, he was compelled to modify the original equation to get the gravitational equation, which required a lengthy explanation in semi-justification of any such liberty.

This is not all of it, however, for the Saha theory prohibits the existence of rings of electrons. The tangential force acting opposes the revolution in exactly the opposite sense from that given by the Larmor-Lorentz theory. Dr. Crehore has consequently changed over from a ring atom to an atom that he calls the Copernican atom having a revolving nucleus and stationary negative electrons. This change makes the gravitational force fit exactly without the necessity for the introduction of any multiplying factor as before. Without such a factor the force came out something like ten to the twenty-seventh power too great, as explained in his book.

The recent announcement that astronomers at the great Mt. Wilson observatory in California have been able to measure with accuracy the arc subtended by the star Betelgeuse, located at over one billion millions of miles from the earth's surface, indicates new triumphs that physical science has attained. It is to be hoped that still more interesting advances in the electro-magnetic theory may soon be developed due to this ever increasing standard of delicacy in physical measurement.

Tangible Results of Cooperation

As the result of business conditions Christmas shopping in most of the cities of the country was nowhere near as large this year as in the past few years, and as a result some of the members of the electrical industry have picked a seat on the mourners' bench and proceeded to give vent to their feelings by tears or curses according to their several dispositions. Realizing that an incentive was needed to make the public give electrical gifts, the British Columbia Electrical Cooperative Association in Vancouver decided to give an electrical show just before the Christmas shopping season opened, and try to impress upon the public that electrical gifts were not luxuries but essentials in any properly conducted house.

The results of the show, to which admission was charged, show up in the Christmas sales of the contractor-dealers of that city. Not only were the sales larger than those of the previous year, but they were marked by cautious buying instead of the reckless spending which has marked the post-war period. Vancouver is in practically the same condition as the rest of the cities of the Northwest, but through cooperation and faith in the goods that they had to offer, the retailers had succeeded in increasing their sales, and look forward to the future with a feeling of optimism.

The results of the cooperative movement in Vancouver have made the Vancouver electrical retailers the greatest boosters for cooperation, and have strengthened their belief in themselves. This should prove disconcerting to those who have not come into the fold, and who have laughed at the cooperative movement as an idealistic thing which would never be practical. There is still lots of room for real cooperative work, and the sooner some of the communities which have not taken it up do so the sooner they will enjoy the results which come from it.

A New Journal Service

BEGINNING with the March first issue of Journal of Electricity and Western Industry there will be a series of articles on elementary accounting especially designed for the use of contractor-dealers and small industrial plants. This series has been specially prepared by Professor H. R. Hatfield, Dean of the Faculties, University of California, and a world-wide authority on matters of accounting. This course was prepared in connection with the accounting system recommended by the National Association of Electrical Contractors and Dealers after it had actually been tried out in a typical contractor-dealer establishment. An added feature of the course will be that questions which are not explained in sufficient detail in the lessons will be given individual attention by the Extension Division of the University of California. Journal of Electricity and Western Industry feels that this study course will accomplish a great deal in helping the contractor-dealer or manager of a small plant to install a proper system of accounting which will improve his business methods and credit.

INVESTIGATION OF CALIFORNIA RAILROAD COMMISSION

The investigation of the California Railroad Commission, which has been instigated by the California State Legislature and entrusted to a committee appointed by that body, has brought out few complaints against the Commission which can be taken seriously. Charges brought up at different times during the investigation may be analyzed as follows:

1. Objection has been made to what the complainants have called the "cost plus" system of fixing rates alleged to have been adopted by the California Commission.

2. The Commission is accused of letting hearings go "by default"—that is, taking corporation figures and not investigating the other side.

3. There has been some objection to regulation of municipal corporations.

4. It is contended that specific penalties should be provided by the Commission for overcharging on the part of public utilities.

5. Numerous specific and mostly trivial complaints have been brought by individual consumers who have felt that their rates were too high or that they had not been given adequate hearing.

The investigating committee of which Senator J. M. Inman, originator of the resolution asking for the hearing, is the chairman, has stated that the question of cases going by default has been settled and that there is evidence that the Commission is giving every possible assistance to those who bring complaints. The committee also states that it believes the term "cost plus" to be a misnomer as generally applied to the Commission's method of fixing rates.

The specific complaints have in most cases been answered adequately by the Commission, although some of them, particularly those arising out of the unprecedented drought conditions of 1919-1920, must in the nature of things remain a matter of opinion. The Commission has presented figures showing that of 8,500 formal decisions issued by the Commission, only 88 cases have been appealed. Of these six are still pending and in only fourteen instances has the Commission been overruled.

Hearings have been held in San Francisco, Stockton and Los Angeles, as well as in several other of the valley towns, and it is expected that the committee will make its report when the legislature reconvenes on February 24th. Statements from members of the committee indicate that there are likely to be some recommendations for increased penalties against overcharges and similar offenses by public utility corporations. What further action will be taken is a matter for conjecture, although there have been threats from other sources at various times that bills are to be introduced making the choice of commissioners elective rather than appointive and providing that local regulation of utilities within city limits be optional with the city governments. It is to be hoped that the clean showing made by the Commission throughout the hearing will be officially recognized by the investigating body.

SAN FRANCISCO BAY SITE CHOSEN FOR WESTERN NAVAL BASE

Detailed plans for the naval site which the congressional committee recommended be established by the United States Government at Alameda, California, involve an ultimate expenditure of $100,000,000, according to estimates of the general navy board. This expenditure will of course be spread over a number of years, the base probably reaching final development some time within a period of fifty years.

The base will cover 5,340 acres extending from Oakland inner harbor southward almost to Bay Farm Island and eastward to a point to the south of Neptune Beach. It will serve as the main repair and supply station for the Pacific fleet. Among the structures contemplated are:

A destroyer basin, depth 25 feet, with finger piers, fueling, etc., of sufficient capacity for berthing and fueling of a squadron of 54 destroyers in all conditions of weather.

A submarine basin, depth 25 feet, with finger piers, fueling facilities, etc., of sufficient capacity for berthing and fueling 36 submarines in all conditions of weather.

To provide for the extra facilities for destroyers and submarines, the McKean board made an estimate that $51,600,000 more should be spent on the base.

The general board of the navy has added to the plan of the naval base facilities for a base for fuel oil and coal, shipbuilding activities, aviation fields and training and other stations.

The original layout of the Helm commission contemplated expending $36,000,000 for a repair and supply station for the Pacific fleet. In addition to two 1,030-foot drydocks, to cost $3,500,000 each, the commission planned the following:

Three piers, 1,200 by 100 feet, costing $2,610,000.

One ferry slip, 1,200 by 150 feet; $1,080,000.

One drydock pier, 500 by 60 feet; $180,000.

Shape shop, 600 by 100 feet; plate shop, 600 by 100 feet; forge shop, 400 by 100 feet; boiler shop, 200 by 100 feet; shop for sheet metal, pipe, etc., 600 by 100 feet; mold loft (above shape shop), 600 by 100 feet; machine and electric shop, 600 by 280 feet; foundry, 600 by 180 feet; power plant, 250 by 200 feet; all these to cost, with the proper crane equipment, $5,094,000.

Boat shop, 300 by 100 feet; boat storage, 300 by 100 feet; shipwrights, 600 by 80 feet; joiners, 600 by 80 feet; light woodworking, 600 by 80 feet; flag, sail and rigging, 600 by 80 feet; pattern shop, 600 by 80 feet; pattern storage, 600 by 80 feet; all of these buildings to cost $1,740,000.

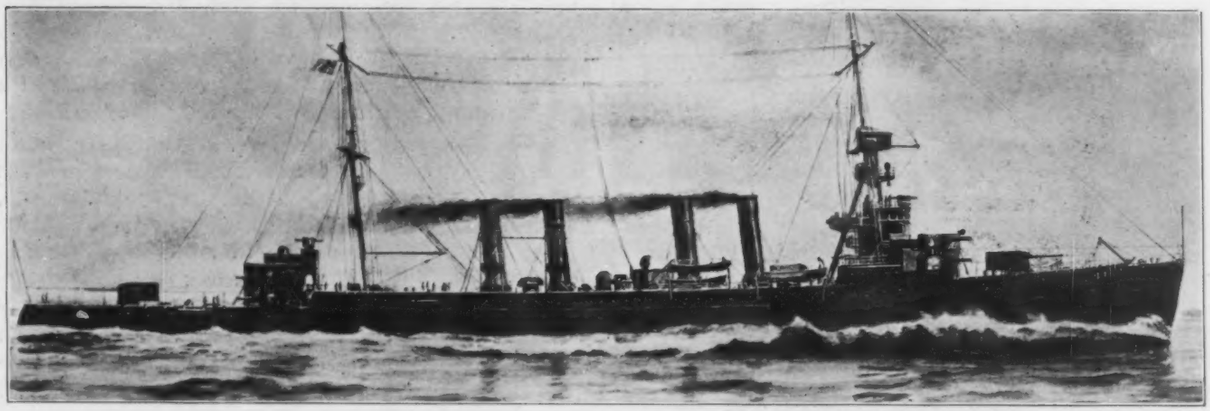
Foundry storage, 600 by 70 feet; steel storage, 400 by 400 feet; heated storage and kiln, 260 by 100 feet; covered lumber storage, 500 by 200 feet; all to cost $984,000.

Administration buildings covering 36,000 square feet; a dispensary 100 by 60 feet; six-story storehouse, 1,000 by 200 feet; all to cost $3,630,000.

Acetylene plant, 80 by 50 feet; galvanizing plant, 100 by 50 feet; paint shop, 200 by 60 feet; locomotive garage, 150 by 100 feet; all to cost $216,000.

The Helm commission also planned 36,000 feet of paved streets, 42 feet wide; 20,000 feet of sewers; 72,000 feet of curbing; 60,000 feet of sidewalks; 20,000 feet of water mains; and 65,000 feet of railroad tracks.

Fifteen thousand men will be employed at the base when the plant is in complete operation.



The new type of U. S. high speed scout cruiser now being built in Tacoma. Each is propelled by four 22,500-hp. turbines—with one exception, the largest power ever put into a ship.

ELECTRICALLY PROPELLED SCOUT CRUISERS BUILDING IN TACOMA

Ten of the new scout cruisers, which are a feature of the naval construction program, have been authorized by the United States government, and three—the Omaha, Milwaukee and Cincinnati—are nearing completion at the Todd yards in Tacoma, Washington. They have a length of 550 feet, displacement of 7,100 tons, and a maximum speed of 35 knots. Their armature is light, but is very efficient. In addition, each will be equipped to carry, launch, and retrieve four airplanes, which will extend their radius of scouting action by hundreds of miles.

The engine power of these vessels is literally enormous — 90,000 horsepower. Never before has so great an amount of power been concentrated in so small a space, nor have ships of greater power ever been built, excepting only the British battle-cruiser Hood. Each cruiser has four propellers and each propeller is driven by a Westinghouse geared turbine of 22,500 horsepower capacity, consisting of two separate units. There are, therefore, eight turbine units in each ship, and since the vessel can still manoeuver if all but one of the units were out of commission, it has to be practically destroyed before it can be completely crippled. Special attention has been given to efficient operation of the machinery at both maximum speeds and the ordinary low cruising speeds, so that the fuel consumption is kept down to a minimum at all times. This efficiency is an advantage from a military as well as an economic standpoint, since it makes possible long voyages without refuelling. The boilers are oil-fired, in accordance with the latest naval practice.

BIDS OPEN FOR 125,000-KW. AUSTRALIAN PLANT

The State of Victoria, Australia, has opened bids for apparatus for a 125,000-kw. steam plant to be located 112 miles from Melbourne. Five 25,000-kw. units for the main station are included in the plan, as well as three terminal substations and 1800 miles of 132,000-v. transmission line. The extensive coal fields adjacent to the site of the development will be opened up as a source of fuel. It is figured that the advantageous lay of the land and the position of the seam will permit of the delivery of the coal at the plant at the low cost of a half-dollar per ton.

The new project is to be undertaken by the government of Victoria Electricity Commissioners and will furnish power for resale to the present distributers. No secondary distribution is planned by the government of Victoria.

As outlined, the plans include three structures, one housing the boiler plant and engine room, a second the control apparatus and offices, and the generating station proper. The generators will operate at 50 cycles, 11,000 volts, single-phase, 9,260-kva. transformers stepping the current up to 132,000 volts for transmission. The 400-volt auxiliary transformers, 400-volt buses and switch gear will be located in the open, as well as the 11,000-volt low tension buses, the high tension buses at 132,000 volts and the high tension switches.

The transmission line is favored by equable climatic conditions, there being no fog nor snow to contend with and comparatively little trouble from thunder storms. No high elevations are traversed and the daily range of temperature is not excessive. It is figured that the cost per mile of the transmission line will be about $15,000. Three terminal substations have been determined upon as the most economical arrangement and will be located 8 miles apart. Nine substations are to be located in Melbourne with approximately 80 miles of 22,000-volt underground cable connecting them. Distribution will be at 22,000 volts.

Bids for apparatus will close on March 31, 1921, and construction will commence immediately following the letting of the contracts. At the present time there are three power stations serving Melbourne, one 22,000-kw. steam station operated by a private company, one 22,000-kw. steam station operated by the city council, and a 78,000-kw. steam station under the state which serves the railway system. It is anticipated that all these will shut down upon the completion of the new plant.

GOODWILL ADVERTISING

During the holiday season, these attractive calendars, bearing the season's greetings, were sent out to all customers of the San Joaquin Light and Power Corporation, and advertisements expressing these kindly sentiments were run simultaneously in the local papers.

ELECTRIC KITCHEN IN POWER COMPANY'S OFFICES USED FOR DOMESTIC SCIENCE COURSE

An effective bit of electrical advertising is made possible by the Washington Water Power Company through the use of the electric kitchen which has been outfitted in the main office building of the company in Spokane. Women's clubs and industrial establishments wishing to carry on domestic science courses are offered the use of this completely outfitted, white-tiled kitchen, and the opportunity is so thoroughly appreciated that the kitchen is in frequent demand.

During the fall of 1920 the Sperry Flour Company, which operates extensive mills in the neighborhood, conducted a domestic science course of ten weeks from this kitchen, which was extremely well attended. The course is more or less of a permanent institution, having been conducted in the same way last year. For those who took the elementary course a year ago, advance work was offered.

The power company furnishes the electric equipment and whatever power is needed for hot water and cooking. It is felt that the good effects of this indirect form of advertising are to be definitely traced in the subsequent sale of electric ranges and help to give Spokane its record of the largest number of electric ranges per capita of any city in the world.

CALIFORNIA MINERAL PRODUCTION IN 1920 SHOWS INCREASE

The statistical division of the California State Mining Bureau estimates the mineral production of California for the year 1920, just closed, at a total value of approximately $242,142,000. This is a conservative figure and includes all products, metallic and non-metallic, being in advance of the actual figures which will be available later after the complete returns are received from the various producers. This is an increase of approximately $45,600,000 over the 1913 total of $196,473,560, and is due to the greater quantity of petroleum coupled with the continuing advancement of crude oil prices.

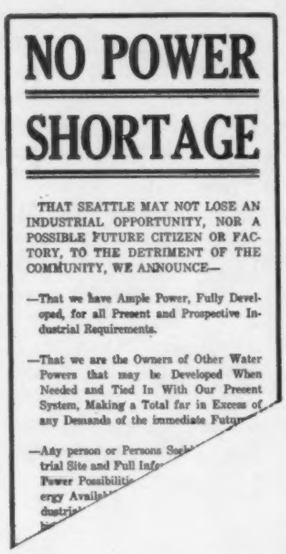
The greater petroleum yield is the result of bringing in new wells in the Elk Hills field in Kern county, and Huntington Beach in Orange county, both of which are showing high-gravity oil (averaging over 30° Baumé). Notable decreases in value are shown by: Gold, approximately $3,000,000; copper, $2,000,000; quicksilver, $600,000. Small tonnages of chromite and manganese ores were shipped, and tungsten dropped out of the active list entirely.

The estimated quantities and values for 1920 are tabulated as follows:

$ 13,950,000	gold.
1,560,000	(1,540,000 fine oz.) silver.
2,340,000	(13,000,000 lb.) copper.
404,000	(5,000,000 lb.) lead.
121,000	(1,500,000 lb.) zinc.
772,000	(9,770 flasks) quicksilver.
40,000	(400 fine oz.) platinum.
194,000,000	(105,000,000 bbl.) petroleum.
37,000	(1500 tons) chromite.
78,000	(2,500 tons) manganese.
840,000	(70,000 tons) magnesite.
4,500,000	(55,000,000 cu. ft.) natural gas.
16,000,000	brick, cement, building stone, crushed rock, etc.
2,000,000	miscellaneous "industrial" minerals.
5,500,000	salines (including borax, potash, salt, soda).
$242,142,000	total.

SEATTLE POWER COMPANY ADVERTISES NO POWER SHORTAGE

Urging industries to locate in the Northwest region, the Puget Sound Power and Light Company, with headquarters at Seattle, have been advertising recently in local papers with a view to counteracting any possible impressions of a power shortage which might deter individuals or companies from entering this field. One of these advertisements reads:


NO POWER SHORTAGE

THAT SEATTLE MAY NOT LOSE AN INDUSTRIAL OPPORTUNITY, NOR A POSSIBLE FUTURE CITIZEN OR FACTORY, TO THE DETRIMENT OF THE COMMUNITY, WE ANNOUNCE—

—That we have Ample Power, Fully Developed, for all Present and Prospective Industrial Requirements.

—That we are the Owners of Other Water Powers that may be Developed When Needed and Tied In With Our Present System, Making a Total far in Excess of any Demands of the immediate Futu

—Any person or Persons Seek trial Site and Full Infor Power Possibiliti ergy Availab dustri

Advertisement run in Seattle papers

That Seattle may not lose an industrial opportunity nor a possible future citizen or factory, to the detriment of the community, we announce—

—That we have ample power, fully developed, for present and prospective industrial requirements.

—That we are the owners of other water powers that may be developed when needed and tied in with our present system, making a total far in excess of any demands of the immediate future.

—Any person or persons seeking an industrial site and full information concerning power possibilities and the electrical energy available for factories or other industrial uses will find such information by consulting us.

This advertisement was run in two-column width in a conspicuous position in the paper and undoubtedly had a good effect in increasing community confidence in the power company.

The Human Factor in Industrial Lighting

BY JAMES R. CRAVATH

(Among the factors contributing to industrial efficiency few have been proved of greater importance than correct and adequate illumination in industrial plants. The following article takes up this vital subject with special reference to a number of convincing tests recently made. The author is an illuminating engineer, formerly of the firm of Fowler & Cravath, Chicago. The Editor.)

Men in the electrical field have been talking much the past two years about bettering industrial plant lighting. In fact, probably more has been said and written on this subject and more efforts have been made to interest the factory man during the past two years than in all the history of illuminating engineering previous to that time. It may be of interest here, both to the electrical man, who has not closely followed technical illumination investigation, and to the engineers and owners of industrial plants, to summarize briefly, without going into too many technicalities, some of the principal things which have caused this awakening in industrial lighting.

For a number of years previous to 1918, lighting experts had been reiterating the general proposition that the cost of adequate lighting in an industrial plant was but a small percentage of the payroll and that therefore it was likely to be an expensive mistake to impair the efficiency and output of an employe by allowing him insufficient light. It had also been known that the statistics of large accident insurance organizations show a larger number of accidents during the months when there is considerable artificial light than during the summer months, and the conclusion was drawn that the prevailing insufficiency of artificial lighting was largely responsible for this increase. Up to 1918, however, there was considerable lack of definite figures as to the benefits of better lighting. The piling up of such evidence since that time has caused the awakening referred to.

Tests in Industrial Plants

During the latter part of the great World War Mr. William A. Durgin, assistant vice-president of the Commonwealth Edison Company of Chicago, a man of high standing in the illumination field and of broad experience in scientific and commercial testing, conceived the idea that he and his company could render an important service to the country by determining, in carefully conducted tests, the effect of improved artificial lighting on the output in a number of industrial plants. Such tests, of course, were rather difficult to conduct because it was not easy to find industrial plants which were in a position to operate continuously under the same conditions with nothing but a change in lighting to influence the result. The general plan was to operate the factory for thirty days with the lighting installation already in use, and then change the installation to a modern system for thirty days; keeping other conditions the same. Such experiments were, of course, easier to make during war time full production than they would have been under more varying conditions of output. It was Mr. Durgin's original plan to return to the old system of lighting for a second period of thirty days as an additional check on the result, but there was difficulty in doing this for reasons explained later. The results of these tests were startling as to the increase in production with the better lighting, and they have done more to advance the cause of better industrial lighting than anything which has happened in years. Increases in output of from ten to twenty per cent were found by changing to better lighting systems. In an iron pulley finishing shop the old system was using .27 watts per sq. ft. giving an average of .2 foot-candles intensity. This was changed to a modern system using 1.9 watts per sq. ft. giving 4.8 average foot-candles, and the result was a twenty per cent increase in production. The additional cost of the lighting was about 5.5 per cent of the labor cost, or payroll. In a heavy steel machine shop the old lighting system was consuming .6 of a watt per sq. ft. and giving an average of .3 foot-candles illumination. This was changed to a more modern system using 1.7 watts per sq. ft., producing 11.7 foot-candles and resulting in an average increase in production of 10 per cent. In this case the increased lighting cost was about 1.2 per cent of the payroll. In a carburetor assembly shop the old lighting system consumed 1 watt per sq. ft. and produced 1.2 foot-candles average. The new system consumed .9 watts per sq. ft. and gave 12.5 foot-candles average intensity. For an additional lighting cost of less than 1 per cent of the payroll the increase in production was 12 per cent. Mr. Durgin's plan of going back to the old system for a thirty-days' run was never carried out. The factory owners having had experience with the better lighting did not propose to take the loss in production which they felt would accompany a return to the old system of lighting.

The results of these Chicago experiments came out just at the close of the war, and even though the war incentive to maximum production had been removed the high cost of labor remained with all industries, and naturally the operators of these industries were interested in anything which would help to keep down the rising labor cost per unit of output.

Data From Laboratory Experiments

Just as the Chicago tests gave us definite figures as a substitute for the somewhat hazy information which we had before, so certain extensive laboratory tests brought out at the last convention of the Illuminating Engineering Society at Cleveland in 1920 have given us very interesting confirming evidence as to why results like those obtained in the Chicago tests were obtained. For a number of years the lighting industry has been much indebted to Dr.

C. E. Ferree, professor of psychology at Bryn Mawr College for extensive laboratory investigations he has made having a practical bearing on lighting problems. Dr. Ferree was the originator of the Ferree test for determining the loss of efficiency or fatigue of the eye when subjected to different degrees of glare, as, for example, by working for several hours under different systems of lighting.

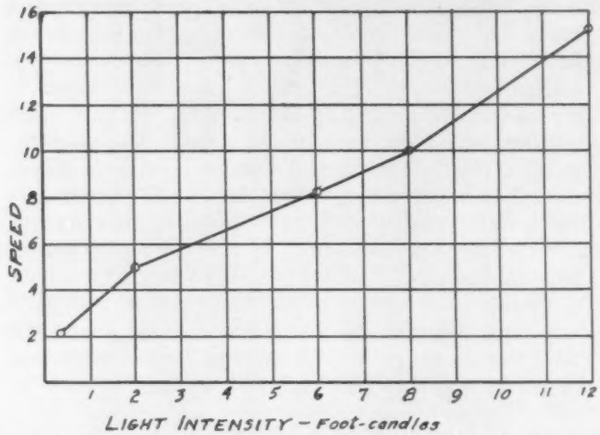


Fig. 1.—Chart showing the relation between degree of illumination and the speed of discrimination of the human eye. Discrimination is much more rapid with high than with low intensity of light.

Another series of his investigations, reported at the 1920 convention referred to, were made on the effect of various degrees of illumination on the ability of the eye to see quickly and clearly. The first of tests upon which he reported related to acuity, which may be popularly defined as ability to see clearly. The test object used was one common in such tests; namely, a white dial with a black circle, the circle being broken at one point and the observer being required to tell at which point the opening in the circle appeared. It was found that the acuity of a normal eye increased very rapidly with the illumination on the test object until about 5 foot-candles was reached, after which the increase in acuity with increased illumination was very slow. So far the results corresponded very closely to those obtained by previous observers, and if the matter were dropped at that point with insufficient consideration the erroneous conclusion might be drawn that an illumination of over 6 foot-candles on the working plane or bench level of a factory would be useless. In fact, just such conclusions have sometimes been drawn in the past.

A large number of eyes are not normal. A refractive defect known as astigmatism is very common. This means that the surfaces of the lens of the eye are not perfectly spherical, the practical effect of which is to make lines in certain planes appear blurred. For example, some astigmatic eyes see horizontal lines clearly and vertical lines blurred. Now, when Dr. Ferree investigated the effect of increased illumination with eyes slightly astigmatic, he found that the gain with increased illumination was more marked than with the normal eye.

The two series of tests just mentioned were made with ample time for the observer to state his observations. In that respect they were more favorable than conditions we meet in real life. Therefore, another set of experiments was carried out to determine the effect of the intensity of the light on the speed of discrimination. These gave some startling results and began to throw considerable light on the reasons for increased factory production with increased intensity of light. The speed of discrimination increases very rapidly with the increase of light as shown by Figure 1 taken from Dr. Ferree's results. This is true not only for increases of illumination below 5 foot-candles, but clear up to 12 foot-candles, beyond which his observations were not carried. Several experiments made on eyes which were astigmatic showed an even more pronounced effect than with the normal eye.

A third point to be considered in the practical working of the eye is that it must be constantly readjusting itself for clearly seeing objects at different distances. Such frequent changes in adjustment are especially necessary in most industrial operations. Typical results obtained by Dr. Ferree in a series of tests on this point are shown in Figure 2, which indicates how the speed of adjustment increases with increased illumination.

In addition to this Dr. Ferree made another series of tests to determine whether increased illumination results in increased power of the eye to sustain clear seeing. Here, too, it was found that the greater the illumination the longer the eye was able to see a test object clearly without blurring, over a period of time. These tests summed up, therefore, show that: (a) in speed of discrimination, (b) in speed of adjustment and (c) in maintaining clear seeing there is a very marked gain under increased illumination within any of the ordinary present values of artificial lighting.

As additional evidence on speed of discrimination, a very simple and interesting experiment has been devised and is now in use in the industrial lighting demonstrations at San Francisco and other points in the country. With it any observer can be shown in a few minutes that discrimination is much more rapid with high than with low intensity of light.

Analysis of Figures Obtained From Test

We can with profit analyze these figures obtained in the laboratory a little further to see their practical bearing on industrial lighting. The laboratory tests were made with .4 to 12 foot-candles. The test object used in these laboratory tests had a white background of about 78 per cent reflection factor. The black circle which formed the other part of the test object probably had a reflection factor somewhere between one and five per cent. The contrast of brightness, therefore, which caused the image on the retina was probably between 1 to 20 and 1 to 1000. Now in few industrial operations are the conditions of contrast so great and consequently so favorable as this; and furthermore, few of the surfaces worked upon will have a reflection factor as high as 78 per cent. Most of the surfaces

will reflect much less than this, and it is the reflected light which reaches the eye and which really counts

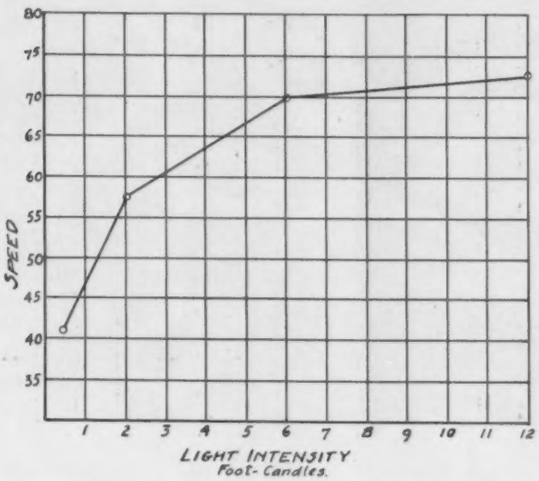


Fig. 2.—Chart showing results of tests to determine relation of illumination and eye adjustment. The speed of adjustment increases with increased illumination.

in determining what and how well we can see. When, therefore, we see laboratory tests like those made by Dr. Ferree within a range of .4 to 12 foot-candles we may safely conclude that for most industrial plant operations there would be a like increase in speed of discernment and in speed of eye adjustment with illumination at the bench levels from two to four times the foot-candles shown on the curves. As a matter of fact, therefore, in our ordinary factory illumination we are working at a point low down on the curve where small increases in illumination mean relatively large increases in the ability of the eye to do its work rapidly and accurately. In this connection also we must remember that it is not simply the illumination on top of a work bench or machine tool that counts, but the ability to see quickly and clearly on all sides of the object.

Then, too, there is another side of the question which has been investigated but little; namely, the stimulating effect of light on human activity. Merchants long ago discovered that light attracts trade, and it has become fairly well established by general practice, if not by scientific test that ample illumination in a store stimulates sales. It is reasonable to suppose that bright lighting in a shop stimulates activity that results in increased production.

Illumination and Industrial Accidents

Another phase of the industrial lighting situation to which forcible attention was called at the last convention of the Illuminating Engineering Society was the high cost of insurance premiums which can be traced back to accidents due to poor lighting. Mr. R. E. Simpson, engineer of the Traveler's Insurance Company, whose interest in reduction of industrial accidents will be evident from his title, deduces conclusions from his company's records that the cost of industrial accidents in this country in round numbers approximates $2,000,000,000 annually. The part chargeable to poor lighting he estimates at about $300,000,000. This he figures is a sum in excess of our yearly industrial lighting bill, and that the misuse and inadequate use of lighting facilities in industry costs more than the light itself. To reduce these figures to a specific example he takes the case of a factory paying the utility company $375 per month for illumination and paying the insurance carrier for unnecessary insurance $866 per month, or nearly two and one-half times as much, because that illumination is not sufficient to permit employes to work in safety.

Mr. Simpson also points out that even a cursory study of the subject will reveal the fact that of late years only a minor percentage of what we may term "lighting accidents" are due to insufficient illumination. He finds instead that accidents that may be charged to faulty illumination are mostly caused by continued eyestrain with its general detrimental effect on our physical well being, by acute eyestrain in a few cases, and by glare, all brought about by improper use of light sources. This serves to emphasize a point which I wish to make in closing, that even though much of the awakening in industrial lighting the past two years has been because of evidence of increased production with increased illumination, the fundamental fact must not be forgotten, that, mere quantity of illumination is not the thing to be sought, but rather ample quantity of the proper quality, which in turn means the greatest possible freedom from glare and sharp shadows and a sufficient uniformity to avoid accidents at the less brightly lighted places. To keep glare within desirable limits in the ordinary industrial plant is a difficult task at best, and the arrangement usually has to be a compromise. But there is a distinct and measurable eye fatigue with light sources exceeding a certain brightness hung within the range of vision, and in making plans for a new installation it should never be forgotten that glare is something to be reduced to its lowest possible terms consistent with the conditions.

LETTER TO THE EDITOR

Mr. Robert Sibley, Editor,
Journal of Electricity,
San Francisco, California.

My dear Mr. Sibley:

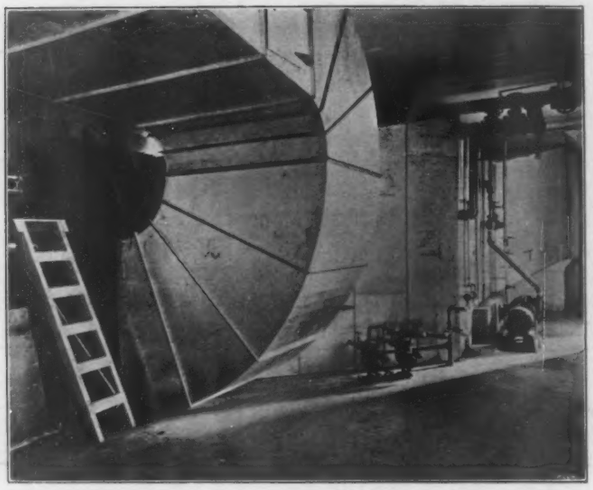
It gives me great pleasure to compliment you on the success of the anniversary banquet held at the Palace Hotel on February first. For your sake, I am exceedingly sorry that Mr. McGraw was unable to be present, as I am sure that he would have been pleased, first, with the character of the guests, second, with the excellence of the speeches and the optimism of the speakers and, third, with the able manner in which you presided through the evening.

It was a compliment to you and to the McGraw-Hill Company that so many representative men of the West made it a point to attend and I am sure it was considered a great compliment by each of the guests that the opportunity was given him to be present at such an important function. The evening will be remembered as one of pleasing intercourse with agreeable people who have helped to make history in California during recent years and I am sure that each one present went away feeling that he had learned something he did not know before.

I want to assure you that the "Journal of Electricity and Western Industry" has my best wishes for its future usefulness and prosperity and in addition to my good wishes, it is needless for me to add that you will have my hearty cooperation whenever it is needed.

Very truly yours,

S. M. KENNEDY.



Fan and air washer in the plant of the California Associated Raisin Company. The washer cools the air in the summer time, while the steam-heated "vento" warms it during the winter.

Driers and fan in a raisin plant. The fan forces the air through the steam-heated pipes and over the raisins. The "ventos" for heating the air are shown at the right of the picture.

Industrial Uses of the Electric Fan

BY C. B. MERRICK

(The popular conception of the electric fan includes as a rule only its ventilating applications. The varied uses to which it is put in modern industrial processes throw a new light on its importance as a factor in production. The following article on the subject is by a member of the inspection department of the San Joaquin Light & Power Corporation, Fresno, California. —The Editor.)

The industries, continually in a process of development, are always eager to make any improvement in their methods which will add to the comfort and convenience of the workers, or to replace a manual operation by a mechanical one. Any improvement which will accomplish these purposes means increased production and income, both to the plant owner and the worker.

Electric fans and blowers, or exhaust fans, are thus used in the industries of the San Joaquin Valley for many mechanical operations as well as for furnishing proper ventilation for the workers. Prominent among these are the raisin and peach industries, the cotton gins and planing mills.

Fans for Ventilation

Large fans for ventilating purposes are used in Fresno throughout the department stores, restaurants and theaters, where the comfort of the patrons is an important feature. They are supplemented at different points in the building by small fans, which keep the fresh air in constant motion during the summer months.

The tabulated data given below will indicate the extent to which these important industries rely upon electric fans in their various processes.

Industry	Use	Fan Type	Diameter	Motor Size
Raisin	Stemmers	Blowers	24″	7½ hp.
	Stem-Pickers	"	24″	7½ "
	Driers	"	9′	40 "
	Dust Collectors	Suction	4½′	20 "
Cotton Gin	Conveying	Suction and Blower combined	36″	25 "
Peach	Driers	Blower	36″	10 "
Planing Mills	Sawdust Collector	Suction	55″	30 "

Drying Raisins and Peaches

In raisin packing the large or main stems are separated from the dried raisins as they come from the vineyard, then the raisins are passed to the stemmers where the air carries off the smaller loose stems and dust, thus practically cleaning them. After this they are passed to the cap stemmer which detaches the small cap stem. The waste is extracted and conveyed away by the use of the air.

Sometimes the raisins are brought in somewhat moist, either because of insufficient field drying or because they have been exposed to a sudden shower after they were practically dry.

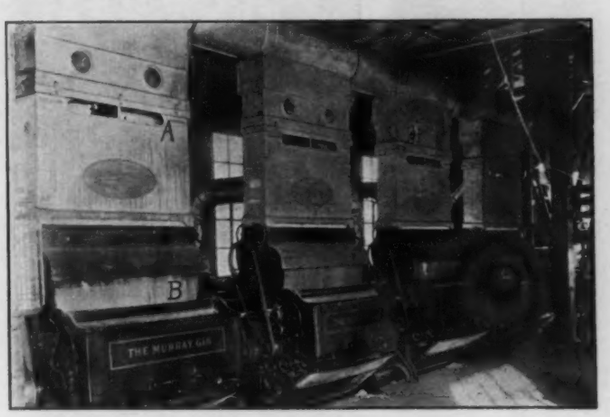
The raisin driers remove the internal moisture from the fruit by the circulation of heated air for a period of one and a half to four hours. Large fans, 9 ft. in diameter and driven by 40-hp. motors, are required to circulate the necessary air through the "ventos," which are heated by steam, and the drying chamber.

Dust collectors have been successfully used in several plants, and hereafter will be installed on all stemmers to reduce the dust stirred up in the shaking process. This will greatly improve the working condition for the operators.

The dried peaches as they come to the packing houses still contain some moisture. Part of this is removed by a superficial drying, requiring only five or ten minutes in a chamber through which heated air is blown and circulated, and through which the peaches are conveyed on flexible metal belts. The

heated air circulation in these chambers is accomplished by a 10-hp. motor-driven 36-in. fan.

In this, as well as the raisin industry, considerable experimental work is being done, resulting in the development of additional successful uses for electric fans in handling the product and expediting processes.



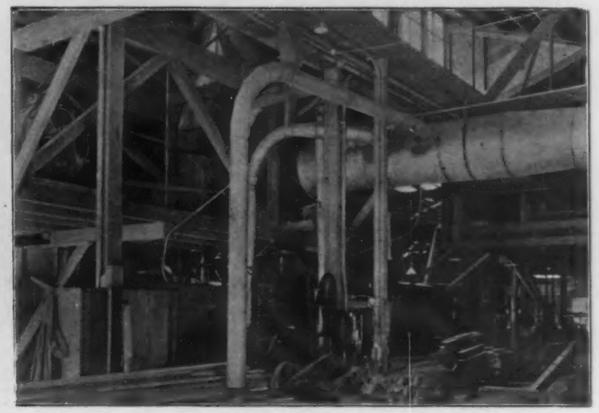
Cotton gins, showing the feed pipe at the top through which a suction fan draws the raw cotton from the car or warehouse.

These packing plants are enormous institutions, and employ a large number of people during the packing season, which is in the summer time. In the raisin packing industry the packing continues on through the winter, and for the purpose of cooling and ventilating in the summer, and heating and ventilating in the winter, in these large plants extensive systems are installed. Exactly similar plants are installed in the various theaters, except that in some cases the air is drawn through ice-charged tunnels in the summer time.

Eliminating the Dust Hazard

At the cotton gins the loose product is conveyed by air from the warehouse or car through the gins and on into the balers so that it is at all times confined, thus eliminating all flying lint, which is not only highly inflammable but injurious to the operators.

The suction fan draws the raw cotton from the car or warehouse through a feed pipe at the top of the gins. After falling through the gin, which pulls the cotton off the seeds, a second fan blows the cotton on to the baler. This fan is operated by a 25-hp. motor, the suction blower and the gins combined being driven by a 50-hp. motor.



Blower and suction pipes in planing mill. These pipes convey the sawdust from the milling machines to the storage bin.

Large planing mills, without dust collectors, were a menace to the health of the workers as well as extreme fire hazards. A Fresno planing mill uses a 30-hp. motor to drive a 55-in. double blower, for collecting the sawdust over the milling machines and conveying it to the bin for storage and sacking. The exhaust pipe at the top leads out through the roof to the bins at the rear of the building.

The extreme convenience and adaptability of electric drive is emphasized in all these uses of the fan, and at the same time the possibility of avoiding detrimental conditions about the plant.

KEEPING A DINNER ENGAGEMENT BY AIRPLANE

In order to attend the banquet given by Journal of Electricity and Western Industry on February 1st, Paul G. Redington, District Forester U. S. Forest Service, flew from Sacramento to San Francisco, joining the rest of the guests at the party as casually as though he had just stepped off a street car. The picture shows his view of the Golden Gate as he circled above the Cliff House and Golden Gate Park before making his landing on the Marina field.

Foundry of the Holt Manufacturing Company at Stockton, lighted with 500-watt Mazda C lamps and bowl type Ivanhoe reflectors spaced on 20-foot centers and mounted above the crane. Eight to ten foot-candles of illumination are obtained. The lighting is evenly distributed and entirely sufficient for all foundry purposes. Actual figures as to increased production made possible by this lighting installation are not available, but it is of record that the results obtained here influenced the Holt Manufacturing Company to modernize the lighting throughout their Stockton plant.

Industrial and Factory Lighting

(As many as 18.8% of a representative selection of important industrial plants throughout the country were classed in a recent survey as having poor lighting. The following article shows how a growing interest in this vital factor in production is fast remedying this condition, and modern standardized equipment is making possible scientific installations in every kind of industrial plant.—The Editor.)

The results of an investigation by trained observers in 446 industrial plants scattered through fifteen of the more important industrial states brought out the fact that an average of approximately 25% of the work done is carried on under artificial illumination. For different plants the proportion varied from 5% to 90%, but the weighted average of the 446 institutions was 25%. This survey also brought out the fact that 55.4% of the men interviewed considered that artificial lighting was vitally important to their business; 31.6% considered that it was moderately important, and 13% that it was of little consequence.

Keeping a Plant Efficient

If a machine contributing 25% of a factory's output was to become disabled so as to reduce production considerably, the plant manager would immediately see to it that it was repaired or a new machine put in its place. If at the time of erection of a plant, circumstances made it necessary to install an under-sized motor capable of turning over the machine at speed equal to but 75% of normal, and conditions changed so as to require the full output from that particular machine, few plant managers would hesitate to replace the motor with a larger size in order to bring production to the required amount. The lighting equipment of a plant is just as much a part of the plant's machinery of production as the machine itself or the motor that drives it. It should have the same careful consideration, and when the time comes to increase production or reduce costs it is just as foolish to neglect to increase or change the lighting as it would be to operate a disabled machine or an undersized motor.

Standardized Equipment

With modern equipment a good lighting installation is easily obtainable. Studies have been made of the requirements of the various manufacturing processes and these data are at hand for the benefit of those who desire to take advantage of them. Equipment has been standardized so that if the ordinary rules of common sense are followed and standard recommended bowl enameled lamps are used with the RLM standard dome reflectors a good practical installation is assured.

A word here about the RLM standard dome reflector may be of interest. It is the reflector and lamp manufacturers' standard, made according to a specification agreed upon by the leading reflector and lamp manufacturers as to efficiency of light output, distribution and cut off to hide the filament of the lamp for the purpose of minimizing objectionable glare. The leading reflector manufacturers make the standard RLM dome for industrial purposes, and all RLM dome reflectors so stamped with a plainly legible label are approved after test by the Electrical Testing Laboratories, a neutral, unbiased testing agency retained for the purpose of insuring that all RLM standard reflectors are up to the rigid specifications of light output, distribution and glare cut off agreed upon by the lamp and reflector manufacturers.

The new bowl enameled Mazda C lamp is fast replacing clear and bowl frosted lamps for both industrial and commercial lighting purposes. The coating of enamel on the lower half of the bulb gives a better quality of diffusion and reduces the brilliancy of the light source, so as to cut glare to a

minimum. The bowl enamel lamp also has the advantage over the bowl frosted lamp that it is more easily cleaned. Practically all authorities on industrial lighting now advocate bowl enameled lamps for all positions where the light sources come within the line of vision.

Let us turn again to the survey mentioned above for the opinion of the trained observers as to the conditions of the lighting in the 446 plants visited. Based on the standards recommended by the industrial lighting code of the Illuminating Engineering Society published prior to 1918, 8.7% of the factories were considered to have excellent lighting; 32% good; 29% fair; 18.8% poor; 3½% very poor; and the remainder partly good and partly poor. To the plant manager desirous of increasing his production or decreasing his costs, these facts suggest an investigation of his lighting condition as a means of accomplishing the desired results.

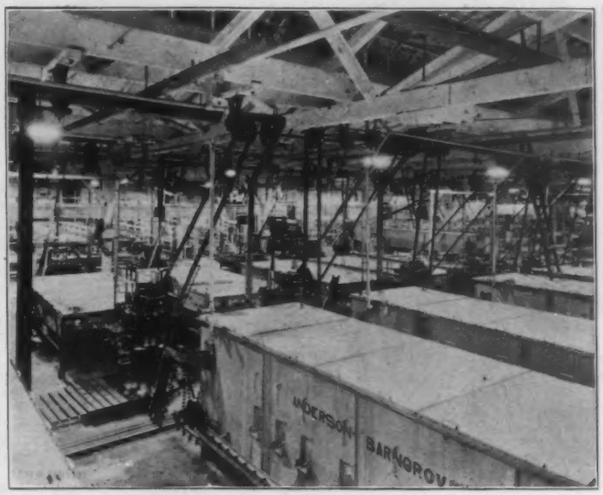
Lighting Exhibits

As a practical help to make such investigations worth the effort, lighting exhibits are being installed at accessible locations in the principal cities of the country where the production manager or the man in charge of the lighting of a plant may obtain information which will aid him in finding the right thing for his needs. These lighting exhibits are a part of a comprehensive plan of education to bring to the industrial, first, a better understanding of the importance of illumination from a production stand-

A night view of the lighting exhibit at the Safety First Museum of the Industrial Accident Commission of California at 529 Market Street, San Francisco. Demonstrations are given here every Friday night where good and bad lighting is contrasted and the fundamentals underlying proper illumination are made understandable. Those who are interested in lighting should not fail to see at least one of these demonstrations.

point; second, an opportunity to see first hand under favorable conditions the difference between good and bad lighting; and third, how comparatively simple it is to obtain good lighting with modern standardized equipment. These exhibits and demonstrations are based on the theory that "seeing is believing," and so simply arranged and constructed as to tell its story in terms easily understood by the practical factory man.

An exhibit has been installed in the Safety First Museum of the Industrial Accident Commission of California at 529 Market Street, San Francisco, and has been in operation since November 22. Weekly demonstrations have been given since that date and



A night view of a California Packing Company plant in Los Angeles lighted by 58 400-watt Mazda C lamps with RLM dome reflectors spaced according to the needs of the sorting and canning tables, cookers, etc. Illumination intensities of from 10 to 20 foot-candles are obtained, depending upon the nature of the processes. The wiring is arranged so that either half of the lights or all of them may be turned on.

will be continued until such time as it has served its period of usefulness. Similar permanent lighting demonstration exhibits are being installed in Los Angeles and Portland and other important Western cities, and should be in operation shortly. Portable demonstration sets are being prepared for use in the smaller industrial communities which are not large enough to warrant a permanent exhibit. Factory men interested in lighting should not fail to take advantage of the first opportunity to witness these demonstrations. They have an important story, which is told in an understandable way.

LETTER TO THE EDITOR

Robert Sibley, Esq.,
Editor, Journal of Electricity,
San Francisco, California.

My dear Mr. Sibley:

I wish to congratulate your Company through your good self for bringing together the distinguished assemblage that graced your banquet at the Palace Hotel on February 1st in commemoration of the thirty-fifth anniversary of the Journal of Electricity and Western Industry, which I was permitted to attend and enjoy the speeches that were made by gentlemen who understand our Western requirements and the developments of the same.

I was indeed sorry that I could not remain until the end, but I was able, however, to enjoy all but two speeches and these have given me not only food for thought, but keen pleasure, because I find that there is, after all, a keenness on the part of our big business men to promote the interests of California, which is worth a lot to me.

If you don't know it some of your people do know, that my endeavor has been for the past eight years in California to stimulate interest in the mining industry of our state, and I have gone to almost the limit at times in advertising the resources of our state, so as to place upon record what has been done in the past and what is being done at present, and what might be done in the future toward the development of our mineral resources.

Again thanking you for allowing me to attend your wonderful banquet and wishing you all kinds of luck, I am,

Yours sincerely,

W. J. LORING.

An Epoch-Making Conference of Western Leaders

POWER officials, bankers, publishers, educators, scientists, engineers and business executives representing virtually every industry in the West assembled at the Palace Hotel, San Francisco, on February 1st, to celebrate the thirty-fifth year of work of the Journal of Electricity. This conference stands as one of the most representative and distinguished gatherings of its kind ever recorded in the history of Western development. The speakers of the evening can be seen at the head table. Reading from left to right they are: C. F. Stern, B. M. Rastall, E. O. Edgerton, E. S. Carman, Robert Sibley, John A. Britton, Franklin T. Griffith, M. M. O'Shaughnessy, and David P. Barrows, each representing a fundamental factor in Western progress.

A Symposium Devoted to the Upbuilding of the West

(Connecting up the seven hundred and fifty million dollar construction program of the Western power companies with the industrial growth of this great empire was the result obtained at the banquet given by Journal of Electricity and Western Industry in commemoration of its thirty-fifth anniversary. Representatives of industry, banking and education were told the needs of the West at this gathering and were shown the future of the West as an industrial center, provided its citizens are allowed to develop the undeveloped resources which assure the future of this country west of the Rocky Mountains.—The Editor.)

One hundred and twenty-seven representative leaders of the great industries of the West were present at the dinner given on the thirty-fifth anniversary of the Journal of Electricity at the Palace Hotel, San Francisco, where the plans were disclosed for the enlargement of the magazine into the Journal of Electricity and Western Industry which will be devoted to the upbuilding of the West. Possibly one of the most representative gatherings ever held in the West, this assemblage of bankers, financiers, leaders of industry, of education and research, engineering and allied professions, listened to the story of electricity and the part that it will play in the upbuilding of this empire west of the Rockies. In all of the speeches one thought was dominant, that the West has before it a future of great industrial development and that the basic industry which would make this possible and be the servant industry for all of those to come would be that of electricity, made possible by the development of the vast blocks of hydroelectric power that lie here undeveloped.

Robert Sibley, editor of the Journal of Electricity and Western Industry, and president of the McGraw-Hill Company of California, acted as master of ceremonies and host of the evening. In explaining the purpose of the meeting and the significance of it to the West he said:

"Gentlemen, in the name of the McGraw-Hill Company of California we welcome you to a symposium, devoted to the upbuilding of the West. In order that we may have a better conception of just who are here, both hosts and guests, I have a little summary of those present this evening that might prove interesting to you.

In the first place, we have a number of electrical manufacturers and electrical jobbers who are the heads of houses that represent firms in Seattle, Spokane, Butte, Salt Lake City, Los Angeles, Oakland, San Francisco and Portland. We have a great number of power companies represented here this evening by their presidents, vice-presidents and general managers, whose service covers a very large and vast territory. We have among bankers, the State Superintendent of Banks and three or four of the presidents and vice-presidents of the large banking institutions of the West. Among educators and scientists we have, on the one hand, beginning with the students, the president of the Associated Students of Stanford University, who is just looking out upon the world, and on the other hand, such renowned scientists as the director of Lick University, who need no further introduction. We have from the electrical engineering faculties of Western Universities, the heads of these departments, both of Stanford and the University of California. We have the heads of the civil engineering department of both Stanford and the University of California, the head of the accounting department of the University of California, the Professor of Forestry from the University of California, the director of the University Extension which has done so much in the upbuilding of our university extension work throughout the West. And, finally, we have with us the head of not only our greatest Western University, but of the greatest university of the nation—the president of the University of California.

Among governmental representatives we have a man who was, until quite recently, the head of the California Railroad Commission. We have the chief hydroelectric engineer of this commission with us. We have the head of the United States Forest Service in California; the head of the California Irrigation Board; the head of the California Accident Commission. We have also the head of the California Water Commission with us.

Among professional engineering staffs we have a vice-president and a recent president of the National Electric Light Association, a past president and a vice-president of the American Society of Civil Engineers, the president of the American Mining Congress. The president of the Pacific Coast Division of the National Electric Light Association, comprising the states of California, Nevada, Arizona, and also the president of the Northwest Electric Light and Power Association, comprising the states of Oregon, Washington, Idaho, Montana, Utah, are both with us this evening. The president of the Joint Engineering Council is with us this evening, and the president of the San Francisco Engineers' Club. A member of the Council, recently formed, of the Federated American Engineering Societies, of which Herbert Hoover is the president; and finally, we have with us the president of the American Society of Mechanical Engineers.

Among chambers of commerce we have a representative of one of the important departments of the San Francisco Chamber of Commerce, a representative of the Los Angeles Chamber of Commerce, the president of the Chamber of Commerce of the city of Berkeley and the president of the Chamber of Commerce of Salt Lake City. We have a director of the California Fruit Exchange with us, we have the head of the Advisory Committee of the California Electrical Cooperative Campaign, the president of the California Association of Electrical Contractors and Dealers, the president of the Pacific Division of the Electrical Supply Jobbers and the president of the San Francisco Ad Club. Likewise, the president of the Foreign Trade Club, the president of the San

Francisco Rotary Club, and the president of the San Francisco Electrical Development League. So much, then, for that type of representation. Among the press, we are represented by one of the leading publishers of San Francisco, also by high staff members of the other daily presses of San Francisco and this community. In the technical press we have one of the leading editors, aside from the McGraw-Hill Company, as well as the editor of a well known Pacific Coast periodical.

Among users of electricity, carrying the work on down to the farm, we have a member of the California Fruit Exchange, as I have mentioned, who is a large user of power in the grape vineyards of California, and another representative who is a large user of power among the farm products of California.

In industries we have a president and general manager of a large shipbuilding concern, and also another representative who is one of the chief factors in the natural gas development of the West. We have the Pacific Coast manager of the Western Telegraph Company here, we have a representative of the Telephone Company, a prominent member of the metallurgical industry, another prominent member of mining equipment development; also the president of the Western meat packers' industry, a prominent member of the petroleum industry, also the chief engineer of the commercial department of the Standard Oil Company. There is present with us the president of one of our nation's largest fish industries and in naval construction we are pleased to have with us the Commandant of the great naval yard at Mare Island. We have present the vice-president of the Southern Pacific Company, and in the way of industries generally, we have here the president of the California Industries Association.

This summary gives you a conception of the men who are to take part in this conference.

Just a word, then, as to who the hosts of the evening are. The McGraw-Hill Company, Inc., of New York City, is a publishing house that publishes, in New York City, some ten engineering and technical journals, among them such journals as the Electrical World, Electrical Merchandising, Engineering-News Record, Engineering and Mining Journal, Ingenieria Internacional, Power, Chemical and Metallurgical Engineering, American Machinist, Coal Age, and Electric Railway Journal. The man who sits at the head of that great organization is Mr. James H. McGraw, a man who has given to this generation a vision of service to engineering and industry of the highest order.

Some thirty-four or thirty-five years ago there was started, in the West here, a paper known at that time as the Pacific Lumberman, Contractor and Electrician. This paper went on for eight or nine years, and at the end of that time electricity began to take such an important part in the development of the West that it was decided, as it were, to cut a rib from the former paper and by taking the word "Electrician" out of the former name, to found the Journal of Electricity in the year 1895. This journal has from that day on down to the present had a continuous existence. About two years ago Mr. McGraw, the president of the McGraw-Hill Company, Inc., came to California and recognized in the Journal of Electricity a possible outlet, a possible opportunity of helpfulness to the Pacific Coast, that would not in any way take the place of the other ten papers, but rather harmonize and amplify the service of these papers; an opportunity that would give expression, in a business way, in a gripping way, in a powerful way, to industry in the West. As a consequence, the Journal of Electricity which had, up to that time, existed as a separate institution, became incorporated in the McGraw-Hill Company. Within the last month there has been formed a corporation known as the McGraw-Hill Company of California, and this corporation this evening gives to you its initial bow officially in the way of this banquet. The aim of this corporation is to give greater emphasis to the development of the Pacific Coast.

Now, we recognize that the West has tremendous possibilities in undeveloped water power; that there is located west of the Rockies about 70 per cent of the undeveloped water power of the nation, and yet we have only about eight per cent of the people. So important a part do we believe water power and hydroelectric development play in the development of industry, that we feel that the electrical industry is the basic industry in the West. As a consequence, so firmly do we believe this, that we this evening have enlarged the scope, enlarged the vision of the Journal of Elecrticity, and it will, in future, beginning with this issue, be known as "Journal of Electricity and Western Industry," to hook up, inseparably, with our conviction that, as the electrical industry develops, so the West develops. In order, then, to accomplish that we must write this electrical message in language so forceful that men, such as are gathered here this evening, not necessarily technical men alone, but representatives of every branch of industry here in the West, may get that message. In other words, we must do this in order that we may fully develop the West. This, then, is the new scope, the new idea of this great and enlarged vision that we have for the Journal of Electricity and Western Industry.

So we have asked you men to come here this evening to celebrate with us the thirty-fifth anniversary of the Journal of Electricity, and at the same time, while celebrating this birthday occasion, to help us visualize the opportunity of service before us. The sole instruction that I, as editor of the Journal of Electricity and Western Industry have from New York, is to do a good job out here, and in order to do that good job I must have the constructive thought of such men as are here this evening. It will be interesting to you to know that, when we considered the list of men who should be here this evening, we simply said to ourselves, "Now, who are the most representative and constructive men that can be gathered together at a gathering like this?" And you will be surprised to know with what unanimous voice those who were invited accepted the call. As a con-

sequence, we all certainly feel very proud and very happy to have such a constructive, representative gathering as is here this evening.

Returning to the question of celebrating our birthday, I will read just a few of the many telegrams and messages that have come in to us, in order that you may rejoice with us in what has happened in the past thus far; in the constructive accomplishment that has taken place, and then, in a few brief remarks from different speakers this evening, we hope to build up this greater vision of the future of Journal of Electricity and Western Industry."

Mr. Sibley then read some of the telegrams that had been received congratulating the Journal of Electricity and Western Industry upon its thirty-five years of service to the West. The first of these was from James H. McGraw, president of the McGraw-Hill Company, Inc., which ran as follows:

"Chronicling thirty-five years of marvelous electrical progress on the Pacific Coast, the Journal of Electricity is preparing to expand into a periodical of still larger usefulness in the field of electrical and industrial achievement. As you celebrate the past and pledge the future, accept my greetings and congratulations. The years that have gone are secure; with high aim and tireless endeavor let us make those to come more successful, reflecting the buoyant spirit of the West and interpreting and exemplifying its idealistic conception. Leadership and courage are essential but the electrical men of the Pacific Coast possess both. With their backing, which I am sure will be given in full measure, the new Journal of Electricity and Western Industry will go forward to greater endeavor and larger usefulness. I regret exceedingly that I cannot be with you in person on this auspicious occasion as you will know I am with you in spirit, and the McGraw-Hill Company of New York hereby pledges to you and the electrical men of the Pacific Coast its fullest cooperation to make the new Journal of Electricity and Western Industry realize its greatest possibilities."

O. C. Merrill, executive secretary of the Federal Water Power Commission, of Washington, D. C., sent the following message of cheer for the future of the West:

"Regret that the press of duties in organizing the work of the Federal Power Commission makes it impossible to attend the meeting on the development of Western resources. I would like however to express to the meeting through you, my admiration of the energy and initiative with which the West has approached it problems. In the field of water-power development in particular it has maintained the leadership. It is my hope and expectation that under the provisions of the new legislation and through its administration by the Federal Power Commission the Western states will in the near future surpass their record of the past."

Congratulations were received from the American Society of Civil Engineers through their president, George S. Webster:

"Greetings to you upon your thirty-fifth anniversary of the publication of your Journal and congratulations upon your important position in the field of electrical development in the West";

and from the president of the American Institute of Electrical Engineers, A. W. Berresford, as follows:

"The opportunity for the engineer to render service in the public good has never been so great as now, but without adequate means for the dissemination of facts and the collection of facts and the collection of opinion this opportunity must be wasted. The technical press has been quick to place its facilities at the engineer's disposal and to do its share and more in forwarding the work. You and your associates are in no small measure responsible for the adoption of this broad and helpful policy, and I take this opportunity of expressing to you the thanks of the American Institute of Electrical Engineers, our congratulations on your success thus far in your chosen field, together with our certainty of your future success."

As an appreciation of the work done by the Journal of Electricity in the cooperative movement the following tribute was paid by the cooperator of cooperators, "Bill" Goodwin:

"Sincerely appreciate invitation to attend thirty-fifth anniversary dinner of the Journal of Electricity. If I were present I would express the wish that the most excellent constructive work which the Journal has done may ever continue and that all happiness and prosperity for this year and the years to come be yours. I am always happy and anxious to do anything I can to help the Journal in the good work it is doing and feel no little pride in the small part I did in helping it through its early career and some of the troublesome days. My confidence is only strengthened as the years go on. The Journal has made a wonderful reputation for itself and it commands the admiration and respect of the electrical trade of the East, and we are all very proud of its staff."

The National Electric Light Association sent greetings through its executive manager, M. H. Aylesworth:

"N. E. L. A. extends congratulations to the Journal of Electricity on occasion of its thirty-fifth anniversary. Throughout all these years it has been a leading factor in the wonderful electrical development of the entire West."

Herbert Hoover, president of the Federated American Engineering Societies and president of the American Institute of Mining Engineers, sent the following message:

"Most appreciative of your kind offer but regret that engagements in the East on Armenian Relief work make it impossible for me to come to San Francisco at this time. Kindly convey to your committee my best thanks."

W. H. Onken, Jr., editor of Electrical World:

"I hear the call of -the West and it beckons me but I cannot come. Nevertheless I shall place my heart next to the wire and let it transmit its message. My best wishes go out to you. May success crown your endeavors for a greater Journal of Electricity and a greater West. And it will; for you have felt the grip end seen the vision of the West. You know its spirit and how to interpret and apply it. You enjoy moreover the good will and confidence of its leading men. It requires no gift of divination, then, to foretell the outcome. I rejoice with you in this thirty-fifth anniversary celebration and know that whatever the task you and the Journal of Electricity will always be equal to it."

A. W. Leonard, president of the Puget Sound Light and Power Company, one of the largest central stations in the Northwest, offered his cooperation to the new program of the Journal of Electricity and Western Industry:

"I have been endeavoring to arrange matters so as to make it possible to be present. I now find that extremely important matters in this district make it inadvisable for me to be away just at this time, which is a keen disappointment to me. I want to offer heartiest cooperation in every way in furtherance of any program which will mean closer association between and further development of the electrical industry in all of the Western states."

Water Power and the West

JOHN A. BRITTON

(The opening speech at the birthday celebration of the Journal of Electricity was made by "the youngest old man in the industry," John A. Britton, than whom no one is better qualified to review the progress of water-power development in the West and its essential part in industrial growth, and to outline the still greater things which the electrical industry will contribute to Western advance.—The Editor.)

It is with some trepidation that even the dean of this fraternity rises to address you tonight, after having listened to the roll-call of this wonderful gathering. How any man, surrounded by all of the elements of banking, education, business, the press, and all the other concomitants that go with our industry can stand untrembling on his feet, I cannot even guess. I am astounded and amazed, and yet I feel a pride in being called upon to speak about the development of the West.

JOHN A. BRITTON

Vice-president and general manager, Pacific Gas and Electric Co., dean of the electrical industry, who said, "When this great Empire of the West comes into its own the aid of Journal of Electricity and Western Industry will be of incalculable benefit."

Let me first say to you, Mr. Chairman, and to your staff, that I congratulate you upon having reached the years of maturity. I congratulate you upon having delivered a message to the people of the West that has kept alive the spirit and the enthusiasm of the men that have done the work of building the great works that have helped to develop this wonderful West of ours. Through you and your predecessors' industry, your energy, your forthrightness of purpose, you have reached a position now in the journalistic world that you should be proud you have been able to reach, and I vision for you, in the future, a crown of triumph for the things that you have done, and the things that you are going to accomplish. And I bespeak for the Journal of Electricity and Western Industry, men of the West, that you be the sponsors for it from this time forward. You have in your midst an agency for the development of this state second to none, and with the help of that journal in preaching the gospel of the true development of this western coast, a nation of itself is going to be builded up in this great West of ours. Thirty-five years have elapsed since it first began to announce its purpose.

And what was the state of the industry thirty-five years ago? It was but in its swaddling clothes, a mere infant in the industries, faced with a competitor, strong from almost a century of growth, faced with almost impossible things to accomplish. Nature had done much for the industry, and yet it was almost unknown and unthought of. The elements of electricity were present in the air, were present in the snows on the mountain tops, were present in the mountain streams, and yet it was unharnessed and unknown. And through what gradations has it come! And how has the vision of the pioneers in those days, looking from the mountain tops, over the hills and valleys of this wonderful state, seen an accomplishment of those things that they knew was bound to come forth!

And what have the pioneers in the industry done? What has the initiative of the Western engineers accomplished? The whole world has stood up and taken notice of what has been done in this wonderful state of ours. We began the first development of hydroelectric energy. We began the first development of long distance transmission. And even now the engineers of the West, with that vision that has always commanded the respect of the engineering world, are looking forward, and still farther forward, to the accomplishment of what, a few years ago, would have been deemed almost an impossibility; in fact, would have been derided by even the greatest engineers then known. For, from the humble beginning of the first transmission line in this state, at 11,000 volts—an accomplishment even then not thought possible by the engineers—we are reaching out today to a transmission line to traverse this state of over 220,000 volts. From generators with a capacity of not over one thousand horsepower, we are today building and erecting generators that will have a capacity of approximately 60,000 horsepower, and the vision of the engineers is looking to units to be installed in the power houses of this state that will reach 100,000 horsepower.

"A people without vision must surely perish," and the people with vision will go on multiplying in their capacity and their forwardness to the accomplishment of the impossible. The West has always had a vision. From the day when the hardy pioneers climbed to the summit of the Sierra Nevada Mountains, and came down into our wonderful valleys, they have always been in the vanguard of the progress of every development looking to the future prosperity of this state of ours. And with the coming of electricity, gentlemen, has come the prosperity of this state. The industries of this state, fed by the the possibility of cheap power, are going to make of this state, in a very short time, a nation as big as the state of New York. I look to see California, with the growth in the last decade, a state of over twenty millions of people in the next twenty years. And the curve lines of the progress of the installation of hydroelectric power, keep pace with the development of population that surely follows cheap power. Industries follow in its wake. I can see that vision fulfilled to its utmost.

Hydroelectric power has not been developed in these states as it should have been. The deterrent features of it, beginning as far back as 1900, when

the first real development was made, were, first, the production of cheap oil that fostered and encouraged the steam plants, while the hydroelectric plants were not developed to the extent that they should have been. True it is that, in those days, the energy that was devoted to the hydroelectric development was not capable of coping with the high heads that have been made possible in the latter days. Oil, as I said a moment ago, so cheap and bountiful, made it possible to generate electricity by steam as cheap, if not cheaper, than by any hydroelectric process that we then knew. But that day has passed. We are going to conserve the thing that should be conserved, and utilize that which is everlasting and can never be destroyed; for so long as the Almighty rules the earth, so long as the sun shines and the waters fall, so long as nature picks up the drops from the ocean and converts them into snow on the mountains, and so long as the rivers run to the sea, so long will the power be supplied to this glorious state of ours.

When you consider that California has approximately nine million horsepower available, and yet there is developed today less than one million, the potentiality of this state is hard to figure, in the matter of progress in population, in agriculture, or in any of the diversified industries that cheap power attracts. We are a civilized people to the highest degree. Civilization began way back in the garden of Eden. Its first movement was from East to West. It followed along the lines of the Grecian and Roman Empires. It crossed over into France and Spain, and it touched the British Isles. It crossed the Atlantic ocean to the Atlantic seaboard, and gradually has been coming westward and westward until, today, the acme of civilization rests on the Pacific Coast, looking out to that point where West will meet East.

Gentlemen, we have a wonderful opportunity here in this state, one to be taken advantage of by every person, one to be portrayed in picture and talked about in story. And the day is going to come when this great Empire of the West will take its place, and in that day of progress and prosperity the aid of such a journal as the Journal of Electricity and Western Industry will be of incalculable benefit, and we should thank our hosts tonight because they have made it possible for us to get together, if for nothing else than to say to them, "Well done, thou good and faithful servant."

Industrial Research a Vital Factor in Substantial Growth

DR. B. M. RASTALL

(The city is the product and the leader of civilization, and as the city is so will the community be. That the city growth and industrial growth are parallel developments was brought out at the Journal of Electricity and Western Industry banquet by the industrial expert for the San Francisco Chamber of Commerce.—The Editor.)

The largest unit of industry is the city, and the city is the essential unit of our western development. The modern city, of course, is the product of industry, and our industries cluster within our cities, and in the industrial suburbs of those cities. What happens to the city will happen to industry in that city. Already more than half our people live in our cities here in the West. What happens to the city will happen to our western civilization. It is that same city which has helped build up every civilization that has arisen in the world's history, and that same city which has contributed to the fall of every nation that has fallen. We have not yet any too much to be proud of in our American city life. The American cities are great failures, so far. Generations of men who have been superb in the development of industry and of home life and of art and literature have rather badly fallen down in the matter of keeping pace in city growth and development. And I say—not pessimistically, because we are just beginning now to realize that the city is the product of human energy —that the city can be made to grow and prosper and develop just as surely and just as scientifically as any private enterprise as soon as we give the same measure of attention to it. We are beginning torealize that after all the city industrially is simply the mass of its individual enterprises; that the law of the mass is the law of the unit; that socially our cities are simply clusters of homes and institutions, and that the great things that we have done for those institutions and industries in America, we can do for our cities by following exactly the same methods. And the method is the method of system, research and scientific methods.

DR. B. M. RASTALL

Industrial expert, San Francisco Chamber of Commerce, who is pointing out the way to successful industrial growth, ". . . the West is fortunate indeed that great industrial progress is possible through the development of electricity at just the right time."

Now, if I may follow that parallel for a moment longer, we have all realized in America that the enterprise that tries to operate with a ramshackle plant, poor machinery and ignorant workingmen is bound to fail. The city that tries to operate with poor streets, bad public utilities, poor planning and those other things that go to make up a city plant, is sowing the same sort of future for itself. So if we have a poor street system, every industry is handicapped by unnecessary delivery costs. If there is a failure to zone the city so that certain districts are set apart for the best home development and certain districts for the best industrial development, there is another handicap, and we are beginning now to develop our cities with that same careful forethought in their physical development that have been given, as a matter of course, to our industries. Every great American business man has realized that

individual efficiency was the greatest asset that his enterprise could possibly have, and now we are beginning to realize that the city sets its stamp upon every individual that serves industry and holds that individual, almost inevitably, to its own general level of education and recreation and moral condition. And we are beginning to plan and develop our cities upon the side of conditions of living so that we may give to industry in those cities the high level of efficiency.

And, on the other hand, we are beginning to realize that a great city and a great industrial condition can arise only out of a high level of material prosperity; that it takes enormous sums of money to build our modern industrial and city fabrics. Every social thinker has agreed that a high standard of living is absolutely essential to a rapid growth and progress, and that high standard of living must be based upon a general level of material prosperity.

It is only a few years back that the development of industry was largely a hit-or-miss proposition, and we sowed this country from one end to the other with wrecks of industrial enterprises because of that hit-or-miss method. We have developed, in recent years, a science of industry. We know now that to develop new types of enterprises there are certain essential requirements; we know that there is a certain very definite line of procedure which, for success in the long run and upon the great average of cases, is requisite; and whether that is done very formally, as it would be in a great new plant of the United States Steel Corporation where engineers and scientists spent years, not only in planning a great new steel industry, but in planning a whole community surrounding it, or whether it is the even more unique case of an American merchant who goes to London and spends two years before he starts to develop his new enterprise, and then there grows the great Selfridge store of London, or whether it is the little group that very informally starts out to plan a bit of an enterprise in a smaller community, the processes and the problems are the same, involving always, first, the discovery of a real opportunity, then the careful analysis of that situation to formulate and see, so far as it is humanly possible ahead of time, the whole thing complete before any start is made. Then the necessary process of interesting the right number of people, securing the necessary capital. Then the process of formulation, planning and building your plant, assembling machinery, planning your labor force, getting ready to start; and then the first very difficult period of the opening months of management when everything is new, not shaken together, and when various special effort has to be put forward to shape that enterprise into a cohesive whole.

And we have learned also, still more recently, that the city which would progress rapidly must go through exactly that same process; that, instead of the hit-or-miss efforts for new industries which have filled our cities, from coast to coast, with empty, wrecked factory buildings because of poor planning, we must substitute the same sort of scientific, systematic development, following exactly the same lines, the careful study of the community and its surroundings, to ascertain what real opportunities there are there, the building up of a great mass of facts so that very definite provision can be made for those types of enterprises. The selling of those enterprises through salesmanship, and the publicity and the regular business methods, to groups of individuals who can take advantage of them, the providing of the necessary facilities of plant location and street construction, and those other things that make up necessary plant facilities, the promotion of the enterprise upon exactly the same sound financial basis, and lastly, the surrounding of them with all the safeguards that possibly can be secured through good management.

Now, in carrying through such a system for an industry, you have just a handful of things that are involved. First, raw materials — and how tremendously this west coast possesses raw material. It has the greatest forests still left in America, the widest spread of mineral resources in any American commonwealth; fisheries; agricultural produce which is almost limitless, apparently, in its variety and quantity; power; tremendous resources in oil; tremendous resources in electricity which have just been sketched to us; labor, great groups of every variety of skilled labor already, in many of its sections, the most efficient labor in the world, backed by splendid educational systems, by a climate which is absolutely ideal for industrial purposes, altogether creating an almost limitless opportunity in the future. Necessary sites and facilities. You have in the bay district here, space and facilities almost to house the factories of the world; markets—a million and a half people at your very doors, the great future of a nation here west of the mountains, and then the limitless hordes of the East just now in the beginning of commercial existence. It spells any future that you people desire to make for this great western country. All of those things wide open and in the beginning now of a systematic effort of research and promotion and planning that will place you where you will in the commerce and the industry of the world.

There are three stages to California's growth: the great gold era that first made this country known, the agricultural residential development which has given it a national significance, and the great era of power and electricity, the time when you are going into the mountains and harnessing a river and transporting its power, upon a slender wire, to move the industries of a whole region—the time when, like Aladdin of old, as he rubbed his lamp and the genii came to perform wonders for him, we shall press our electric buttons and greater wonders than Aladdin ever dreamed of will spring up at our command. California, this west coast, just at the beginning of its development, is fortunate indeed that those beginnings have come at a time when science and research and great industrial progress are possible through the development of electricity, at just the right time. The world, gentlemen, is yours to command.

The West a Factor in World-Wide Industry

E. S. CARMAN

(The location of the territory west of the Rocky Mountains, facing the great markets of the Orient, put it in a singularly advantageous position not only for internal industrial growth but for the development of foreign commerce. The president of the American Society of Mechanical Engineers called attention to the world-wide scope of the West's industrial activities.—The Editor.)

I bring to you, first of all, Mr. Chairman and men of the Pacific Coast, the greetings from 13,500 mechanical engineers this country over, and also the encouragement from this same body of men for you to continue striving for that which you have set out for. It is worth while, and so we, back East, encourage you in the home of attainment. America is today the leader in world-wide activity. America is the leader in matters financial, and if America is the leader why has she come into this position? We need to look back over the centuries past in order to realize that man produced his living by the toil and drudgery of hard labor. You will recall that it is written that God Almighty ordained that man should earn his living by the sweat of his brow. But man today says, "No, I will do it mechanically." And so I believe that history, in the years to come, is going to record the fact that we have at this time entered into an age which will be known as a mechanical age. This mechanical age, beginning along about the twentieth century, has advanced so rapidly that our industries in America can hardly keep pace with it.

E. S. CARMAN

President, American Society of Mechanical Engineers, who analyzed the future of the West as follows: "A call is heard today for men with vision—men who have that vision so typical with Western men; men who dare to accept a challenge."

And so I can see a still farther advancement in mechanical industry and mechanical appliances, and when I use that term, you men of the electrical world know that there is not any electrical instrument but what requires mechanical apparatus, and so, after all, the mechanical age or the mechanical industry ties up around it all other industries. I see this mechanical age made possible, an age that is inviting the industry, that is inviting the genius of the world. The boy of 18 years of age today is perhaps better equipped with mechanical intelligence than was the engineer of a generation ago. Every boy knows what it is to take apart an automobile engine. He is familiar with it. The world is thinking in terms mechanical.

Now, what about the field? If America is the leader, where is she going to carry on her activities? Is she going back to Europe to carry her activities into Europe? I think not; I think Europe can take care of herself for some centuries to come. Is she coming over these high mountains and down here on to this coast and still westward? I think not. She would go back to the birth of civilization. I believe that the great opportunities of America, in her world-wide activity, lie in that great undeveloped continent to the south of us. There lies South America, rich beyond all description, with her vast prairies and her hidden mines of coal; her mountains with their gold, silver, iron copper — untold mineral wealth. And what does it need? Does it need the hand of the genius that can organize the forces of mankind in such a manner as to bring together the wealth of the mountains and the fertility of the plains? South America today holds in opportunity, I believe, more than did North America one hundred years ago, for South America today has the wealth that North America did not then possess.

If America is to possess the marts of the world, who is going to go before? You cannot sell your goods in any country unless someone blazes the way, and that someone is not altogether the salesman. You have got to have more than facts in selling the world. You have got to have the ability to win their confidence, and the ability not alone to sell, but the ability to set up and to start to demonstrate that that which has been delivered will do that for which it was intended. And I hear a great call going up in America today—I can hear it on every hand,—for men with vision, for men who have that vision that is so typical of you western men; for men who dare to accept any challenge.

And how about this great western country? Are you going to sit back and watch the East grow? Is there any reason, I ask, why this vast plain this side of the mountains should not be a beehive of industry? Are you satisfied alone with the products of the soil? We have those products of the soil back East also, but one thing we do not possess there, and that is the advantage of the wonderful power that nature has given you, and therefore, is it too much to expect, right here in the West, within the next few years, a great industrial center? Men of the West, this coast lies right in the center of an empire.

But what are we to accomplish by going into the world? Is it a matter of dollars and cents? Is that our reason for going? No, I think not. I think I can see in this great spirit out west, the spirit that will go into all the world with America's products, and which will carry with it that spirit so well exemplified in this one verse from a little poem:

"There are hermit souls that live withdrawn
In the place of their self-content,
There are souls like stars that live apart
In the farthest firmament,
There are pioneer souls that blaze the path
Where the highways never end:
But let me dwell by the side of the road
And be a friend to men."

Civic Growth: Its Place in Industry

M. M. O'SHAUGHNESSY

(The water supply, transportation, electrical service, and all other modern conveniences of any city are an unfailing indication of its stage of development. The City Engineer of San Francisco discussed the inter-relation of civic growth and industrial development, and the facilities which make the West an ideal location for an industrial community.—The Editor.)

This is indeed a memorable occasion, the thirty-fifth anniversary of a scientific, truthful journal that has survived all those years. It was a pleasure to hear the reference of Mr. Britton to the early developments in California of electricity. He was very modest about the accomplishments made by himself and John Martin and Eugene de Sabla in 1895 when they started a little plant up in the mountains, and nearly three-fourths of the bankers and business men of San Francisco were laughing at them; they thought they were dreamers. I am very glad that we have dreamers of that kind in California, and that the crop is improving.

M. M. O'SHAUGHNESSY
City Engineer of San Francisco, a leader in civic development, and in charge of the great Hetch Hetchy development, stated: "This is indeed a memorable occasion, the thirty-fifth anniversary of a scientific truthful journal that has survived all those years."

Only last year, down in Fresno, I went back in the hills and saw some work that was being done by Mr. Wishon where the water of the San Joaquin river had been flowing and wasting for years. He built four miles of tunnel and made a hydro drop which created about 50,000 horsepower. This work was done in war time under war conditions, with the high price of labor, and carried through with great efficiency. It made me feel good to look at his work and to recognize that Mr. Wishon, in the words of Dean Swift, was a true philanthropist, as one who made two blades of grass grow where one grew before. Mr. Wishon is a little bit better than that: he made two blades grow where there was none before, because the San Joaquin Valley was a patch for jackrabbits and other very useless animals without water for irrigation, and most of the water for irrigation is derived by pumping.

This is a slight digression from the subject of civic growth and the civic problem of cities in relation to industries. Cities cannot grow without three commodities: first, ample water; second, ample transportation; and third, ample lighting. Nearly all the cities in the United States except Oakland and San Francisco have solved their water problems by owning their plants municipally. There is quite an open field for discussion as to the ability of cities to handle municipal railways and lighting and other intricate utilities, but our American civilization concedes the fact that the plain American citizen should handle his own water supply, and nearly all the rest of the country is committed to that idea except Oakland and San Francisco. We are now commencing to see the light, and on the 8th day of March an effort is going to be made by the city of San Francisco to acquire its entire local water supply. I had occasion, in the past year, to look into the growth of some cities in relation to industrial development, and a very good example is presented by the city of Detroit. That city, ten years ago, had a population of 500,000, and today it has about 980,000 people. This enormous growth in population was, in a large measure, due to the development of the automobile industry. The Ford factory alone created employment for over 50,000 men. There were possibly 15 other factories that all together employed a quarter of a million men, and they came to Detroit to build those factories because the city was level, and because it had abundance of water supply, coal, and other facilities. But they forgot to do two other things: to take care of the transportation resulting from those large factories and to take care of the housing problem, and today a building in Detroit will rent for about three or four times the price of a similar building in San Francisco or Los Angeles. Transportation in Detroit is almost impossible because they have only one mile of street railway track for each 3,500 population, whereas, in San Francisco, we have one mile for each 1,200 of population, and we have some strap hangers with us at certain periods of the day. So you can conceive what the conditions are in Detroit.

Our local cities on the coast have been particularly fortunate in their development. Transportation has kept well abreast of the needs. I believe that the trans-bay region of Oakland, Berkeley and Alameda has kept so far ahead of the needs that the companies engaged in that transportation have been losing money. The companies supplying transportation in San Francisco, except the Municipal Railway, have not had a very profitable venture. For in the old days they obtained franchises to carry passengers for a certain definite rate—five cents—based on $3.00 a day labor and all other commodities at similarly lower prices. Today the field has changed and we have $5.00 a day labor and all the other prices ascending, and yet the people are being carried on the five-cent fare just the same, at the cost of somebody—not of the traveling passenger but of the enterprising shareholder and promoter who developed those properties. But such is the law of the game.

Now, for cities to grow, these essentials must travel in parallel — transportation, light, housing, good streets, parks, schools, and fire protection. Without throwing any bouquets at San Francisco, I believe, except in the matter of water supply, we lead in all those different elements, and San Francisco is very favorably situated for an industrial development, with her harbor, and all the other things that go to make a great metropolitan manufacturing city.

Finance and Industry

C. F. STERN

(The great problem before the electrical industry of the West at the present time is the problem of finance. To keep pace with the demand for electric power brought about by the rapid industrial growth of this region requires the expenditure of millions of dollars, and the raising of this was discussed in an optimistic and enthusiastic address by the State Superintendent of Banks of California, one of the many distinguished speakers at the Journal of Electricity's birthday celebration.—The Editor.)

As a Californian, and a native Californian, I have had a surprise tonight. I never dreamed that in any assemblage where the glories and resources of my native state were under discussion I could feel really modest, and yet I have sat here tonight, flanked by able and eloquent gentlemen on either hand from the state of New York, and I have heard our glories sung by this other "stranger within our gates." I came to California, even before the Journal of Electricity, 40 years ago, but by an entirely different route from those gentlemen who have now discovered us, and in response to an invitation that I was never given an opportunity to decline. I was born in this state, my father was born in California, my grandfather died on Humboldt Bar sixty years ago, and I yield to no man in my love or loyalty for the West; and what I have to say, briefly, tonight will be characterized by the modesty and repression that is part of our western characteristics.

C. F. STERN

California State Superintendent of Banks, speaking authoritatively on the question of raising the $750,000,000 for hydroelectric development, stated: "The resources are here: the money we can create within ourselves, and it will be found here in the West."

It is true, when you sum it up, as I have heard these gentlemen sum it up tonight, that we are the state where nature has seen fit to express herself in superlatives. The most wonderful forests, the grandest harbors, the most wonderful climate, the most fertile soil, the most diversified industries; a state where "every plant and tree and bulb of use to man finds somewhere a congenial home." God and nature have done their utmost in making us the "ten talent" land.

The things, I take it, that are still required in this California of ours, and this West of ours, are the things which you and I must contribute to that picture. First and foremost, let me add to Mr. O'Shaughnessy's essentials for the development of a city—light, heat, water, power, transportation,—the cooperation between the centers of population and the back country that builds and makes centers of population possible. Sometimes I have thought that there is something about bright lights and paved streets that makes the people who dwell within cities feel that God established their town to build and nourish and protect the country behind it. And yet they forget that their wealth and power is contributed to them by the country that built this city. This commercial life blood that flows up and down Market Street, runs out over our highways, our railroads, over our power lines, back into the agricultural heart of California, and brings from there the power and wealth that make possible this, or any other center of population. And it is only as we move to the intensive cultivation of those valley lands; it is only as those rolling hills out there are made to bear fruit; it is only as our waste waters are conserved and controlled and utilized that this, or any other city so situated, can hope to grow and prosper. And as this meeting has developed tonight, it seems to me that those power lines that span the distance from the snows on the Sierra to this city by the Pacific are emblematic of that final and essential qualification for the development of the units of population, the cooperation that ties the problems and the resources of the back country to the development of those centers and units of population. That is the first contribution that you and I must make.

And then, of course, all of this development must be financed. The things that we have done, noteworthy and fine as they are, are just the beginnings. We have only scratched the surface. We have only picked up the things that are easy and accessible and cheap. The big things are yet to do. Only three million acres out of 101 million acres in California are under irrigation systems at this particular moment. Only a small percentage, less than fifteen or sixteen per cent, of our valley lands have had water scientifically placed upon them. We have only begun, and to go forward takes money, and it takes thought, and it takes more cooperation.

Take the question of water. Its relation to the development of hydroelectric power has been touched upon here tonight. Yet there are other interests. Distinct agencies in this state today are handling water for their own problem, as if no other use or problem existed. The body that is saddled with the responsibility of flood control sees only one thing for water, and that is that it shall be quickly and safely taken from the mountains and poured into the sea. The hydroelectric engineer is apt to believe that the only utility for water is that of white coal for the development of power. The irrigationist's idea is that the only thing for water to do is to make the land produce. I say to you, gentlemen, that there is not water enough in the West, and there is not going to be water enough or money enough in the West to develop these programs separately. The time has come when we must look these problems squarely in the face and recognize that, if our various needs that may be served by water are to be served, it requires that every drop of water that falls upon

the summit of the Sierras be taken in hand and cooperatively, scientifically and systematically be put across the hurdles, and made to answer every use that water can answer before its remnants reach the sea. And that means cooperation and thought and money.

Now, where is the money coming from? Every developing, pioneer state such as ours has had a creed to make its industries attractive for outside capital. You have heard that expression very many times. "Outside capital!" I will give you one that is better. It is "Inside capital," developed by our own people and put to work in our own cause. And if we do that and adopt that motto, then the 750-million dollar program that Mr. Sibley has given to me is not beyond our powers. A statement from my office shows that the state banks of California faced the new year of 1921 $176,000,000 greater in resources than they faced the new year of 1920. That was the contribution of the depositors in the state banks alone of California to the ultimate meeting of the problem that these gentlemen have presented—$176,000,000 in a single year. Even we Californians have learned the habit of thrift. I say to you that there are over two million depositors in the state savings banks of California today—better than every other man, woman and child that you meet on the streets outside—and that the average deposit is over $600.00. There is your source of money, you hydro-electric people. Those are the people that you must sell, and there is where you will find your 750 million dollars to meet that problem. The resources are here; all that God and nature could give us. The money we can create within ourselves, and it will be there.

We have our feet firm and flat upon the most essential fundamentals that guarantee the prosperity and wealth and development of this state of ours. Gentlemen, we need nothing but faith. We need faith in our destiny, faith in our state, and faith in ourselves. Let us go forward. We are sound. We ought to know it. We know it, we ought to feel it. If we feel it, we ought to express it. Believe and believe, and keep on believing, and some day, in the language of St. Paul, "our faith will have made us whole," and these things that we are trying to dream tonight will have been accomplished for us.

Helpful Utility Regulation an Aid in Industrial Growth

E. O. EDGERTON

(With undernourished and ineffective utilities, a community cannot prosper, nor is industrial growth possible without a sound basis of service and confidence existing between the public utilities and their consumers. The fundamentals of helpful public utility regulation were emphasized in the talk given by the past president of the California State Railroad Commission at the 35th anniversary banquet of the Journal of Electricity.—The Editor.)

I speak to you tonight about regulation—helpful regulation. Of course, it must be repressive in a measure. But the big element of regulation that is really worth while is the constructive element of it. I assert, with confidence, that regulation will be a vital factor in the development of the West in that it has such a powerful and effective influence on the development of our great public service corporations. You must realize this: that in creating state regulatory bodies the people have created an agency through which the state itself speaks. You must remember that, when your regulating body makes a pronouncement affecting the credit of these great public service corporations, the state itself has spoken. You must remember that not only those in other states but our own people look upon those pronouncements as the pronouncements of the whole people, as pronouncements by authority and of vital effect. The most energetic, and perhaps the utility service which has expanded to the greatest degree and will have the greatest effect upon our growth in the West, is that which generates and distributes electric energy. There is one thing, and one thing only, that will get the money to finance the tremendous developments planned by this industry, and that is the confidence of the investor in the enterprise, and his confidence in the authority of the state of California towards his investment. If he lacks that confidence, there is no power on earth to force that money into these enterprises. That illustrates the importance of regulation in the development of such an enterprise having so vital an effect upon the West.

E. O. EDGERTON

Former president of the California Railroad Commission, recognized authority on utility regulation, said: "I look forward with confidence to Journal of Electricity and Western Industry to get the right information to the public. If that is done I have the utmost confidence in the development and progress of the West."

The test is coming in California as to whether or not our people are intelligent enough, whether they either will be informed or will inform themselves sufficiently of the facts, to sustain sound regulation, and upon that test will depend the development of this state and the states of the West; because no matter how sound a regulating body may be, if it is not supported by public opinion it will fail. If every act of such a body is to be criticized, if because momentarily a decision which it makes favorable to a corporation is unpopular, and the agencies of publicity criticize and condemn it as an enemy of the people, and the people get the conception that, instead of working in their interests, it is working against them, sound regulation will fail. Not only will you fail to inspire confidence in the investors, but you will discourage the initiative displayed by the men who have indulged in these great

visions of development. The fact is that the more development is encouraged, the sounder the policy of regulation may be, the greater the confidence the people have in the policy of the state of California towards these great enterprises, the cheaper the service is to the people. It seems an absurd proposition that the people should deliberately throw away the great asset of credit which is possible through the sustaining of sound regulation.

Now, I have great confidence in our people as a whole, and particularly our people in the West, that if they know the facts, if they come to an understanding of the situation, there will be no question about their attitude. It is a sobering thought, surely, which must come to those in charge of the agencies of publicity that they carelessly or wantonly criticize, and condemn, perhaps, some little local situation which in the broad aspect of the whole matter is trivial, and by that act break down this confidence which is so vital to the development of the West.

Of course, sound regulation alone cannot accomplish this task. Sound regulation must be supported by the proper attitude on the part of the utility corporations themselves. There must be the conception, from the management clear down through the organization, that the prime purpose of these enterprises has become public service, and that a selfish attitude will prove disastrous. But I can say to you now, after years of experience, that the whole tendency and the marked tendency on the part of the management of the great public service corporations is towards that viewpoint. In fact, I have heard executives of the greatest companies in the state of California announce that they are public servants, that the prime purpose of their organization is to serve the public. Of course, they are trustees for their stockholders; of course, they must conserve the interests of those who have invested their money, but their conception is that the best interests of their stockholders lie along the lines of the best service to the public.

I can say to you, after a very considerable experience, that the only agencies possible to perform the great tasks are these public service corporations. It is a practical impossibility for the public to take over, at this time, these great corporations and operate the property in the public interests. The financial aspect of it alone makes it absolutely impossible. Conceive, if you please, the power companies alone in California, and suppose it was seriously considered that the state immediately take them over and thereafter do the development and operating of these properties to serve the public. Of course, nobody knows what the figure would be as to the purchase price, but use a billion—it is somewhere in that neighborhood—a billion. Imagine the state of California bonding itself for a billion dollars and marketing those bonds. And then, on top of that, further financing another billion for proper development; and in addition to that, imagine the immediate creation of the great organizations to handle the highly technical problems involved in this operation. I say to you that our people would not seriously consider such a proposition. If it ever comes it will be in the distant future.

So that today, the sound and the intelligent thing to do is to support these companies; to make them strong, to make them prosperous, to make them able to do the job; and I denounce, as a public enemy, the man who deliberately seeks to tear them down, because he is not hurting alone the interests of those who have invested, he is hurting the whole people of the West. And I look forward, with much confidence, to the journal which Mr. Sibley represents as a medium to get the right information over to the public. If that is done, I have the utmost confidence in the progress and development of the West.

LETTER TO THE EDITOR

Mr. Robert Sibley, Editor,
Journal of Electricity,
San Francisco, California.

Dear Mr. Sibley:

Twenty-five centuries ago people had a little blunt knowledge of the magnetism of the loadstone and the electricity of amber. **Three and one-half centuries** ago Gilbert, England's finest physician, sharpened the edge of knowledge about magnetism. **Two centuries** ago Stephen Gray, one of England's humblest, living in an almshouse, discovered the distinction between conductors and non-conductors. Less than **two centuries** ago Franklin, the distinguished American, discovered the identity of electricity and lightning. **One century** ago Oversted, the Danish leader in Physics, discovered the fundamental relation of electricity and magnetism. Then things began to happen at an enormously accelerating rate. After a time these men and others like them were remembered as:

> "A legion that's never been listed
> Which carries no colors nor crest,
> But split in a thousand detachments
> Is making the road for the rest."

The isolated, generally unknown, road-making pioneers have been replaced by an army of cooperating, progress-compelling persons for whom the beautiful lines should be revised. Through the Journal of Electricity and Western Industry road makers and their work will become known as never before.

The McGraw-Hill Company of California did a fine thing for the civilization that is and that will be in the Far West by celebrating the thirty-fifth anniversary of the Journal of Electricity through your grand call to the service for which the new Journal has been established and pledged. I rejoice in having had the privilege of being present at the celebration-banquet.

With all good wishes,

Cordially yours,

HARRIS J. RYAN.

LETTER TO THE EDITOR

Mr. Robert Sibley,
Editor, Journal of Electricity,
San Francisco, California.

My dear Mr. Sibley:

I take this opportunity of thanking you for the splendid evening's entertainment I had on Tuesday evening last as your guest at the Journal of Electricity's birthday party.

I enjoyed every minute of the time I was there—and the wonderful symposium which you presented brought home your message of the ultimate destiny of the West, in the most forceful fashion.

I was unable to catch you after the banquet to extend my thanks and congratulations—and I am taking this means instead.

Sincerely yours,

E. J. GOUGH,
Managing Editor,
The San Francisco Call.

The Vision of the Industrial West

FRANKLIN T. GRIFFITH

(Representing the great Northwest territory at the birthday celebration of the Journal of Electricity was the president of the Portland Railway Light & Power Corporation and chairman of the Federal Water Power Committee, who spoke of the national aspects of Western water-power development and their relation to industry.—The Editor.)

I have been greatly edified tonight, I have heard a great deal about the West, but the West, in the minds of every speaker thus far who has addressed you, has been California. Now, I am not insensible to the honor of addressing you, and I feel more or less at home here because, at one time, I was a Californian. It is only thirty years ago that I went even into a better state.

FRANKLIN T. GRIFFITH
President, Portland Railway Light and Power Co., national authority on water power development, said: "I have noticed, with a lot of others in the Northwest, that the Journal of Electricity is doing a work of great value to the industries of the West. We are appreciative."

You notice, when Mr. Britton was congratulating our hosts tonight on the fact that in 35 years they had reached the age of maturity, he omitted, whether intentionally or not, I don't know, referring to the fact that they had reached years of discretion. I sometimes think that any publication printed in San Francisco, while it may pretend to serve the entire West, is so color blind that it cannot see anything beyond the boundary line, but of late I have noticed, together with a lot of others in the northern portion of this coast of ours, that the Journal of Electricity is really doing a work of great value to all of the industries on this coast. We are appreciative. I have also noticed that the Journal has presented facts which, if they were widespread, would be of incalculable benefit to the industries. It is unfortunately true, however, that such a publication as the Journal comes usually into the hands of men who are associated with the industry it represents, and the general public does not get the message. The great work before the men of the industry is to get that general message to the public, to the people. We men who live these problems day by day are more or less familiar with the things they write about, but there are facts printed that would be of great value, instructive educationally to nine-tenths of the people we are serving.

I was interested also in the reference of Mr. Carman to the mechanical engineers—in his official capacity—and I think it is quite natural that he should boast a little bit: 13,500 mechanical engineers! Some of us have three or four of them around, and we wonder what on earth we would do if we gathered any more of that great army.

And then Mr. O'Shaughnessy came up here and in this gathering, of course, he could not talk very strongly about municial ownership of public utilities. He is a big man and he is a brave one, all right, and he comes of a race that never turned tail to anything, but he would not say that the street car system of San Francisco could run at five cents and make money even if it were entirely owned by the city. He was good enough to say that somebody is contributing a portion at least of the fares of the people traveling on these cars.

And that comes down to the question that Mr. Edgerton discussed, that these utilities should receive adequate rates, that they should receive rates sufficient to command credit. And we get over to my modest friend, Mr. Stern, who sternly admonishes you that you have within your own limits, right here in California, all the resources necessary to bring about all of these things that John Britton has been dreaming about for the last hundred years, more or less. And by the way, we speak of him, as he was introduced tonight very lovingly, as the dean of the industry; we refer to him as the Grand Old Man of the electrical industry. I think sometimes that he has found a better remedy than the glands of goats or monkeys. It must be that he has absorbed some of the commodity he distributes to the people. At any rate he is the youngest old man in the industry, and it is in no small part due to the untiring energy of John Britton that the possibilities of public service are becoming known to the people of California.

We have this important question before the Federal Power Commission. All talk about great developments in California and throughout the West comes right back to the attitude of the federal government. Bear in mind, when you talk about nine million potential horsepower in California and seven million in Oregon and a like quantity in Washington, that ninety-four per cent of all the potential undeveloped water power in these United States is subject to a federal permit—ninety-four per cent of it. It is, therefore, of vital importance that the regulations to be promulgated by the Federal Power Commission should be such as will command confidence, such as will hold a promise of success to the men who are willing to venture in this industry. We have accomplished some things. It is definitely fixed, as one of the principles of all development on the public domain, that no developer may capitalize that which he is granted by the government without cost, and I want to say to you now that that is the correct principle. We should not be permitted to capitalize that which belongs to all the people. But we should, by all means, and by all codes of ethics, be permitted to capitalize and to earn a reasonable return upon the honest investment we make in the developing of this property. It would be well if you bankers, you men to whom we will address our appeals for money to make these great developments on this coast, would

interest yourselves in the formation of these regulations. It is taken for granted, when we go down to Washington and talk to these Federal Power Commissioners, that we are prejudiced, that we are selfishly interested in the formulation of the rules, that we want those things that we think are right, whether they are in accord with the ideas of the men who pass upon these regulations or not. We want to have your cooperation; we want to have your assistance; we want to have the O.K. of the financial powers of this coast that what we are asking for is only that which is fair and reasonable and which ought to be granted. We are asking for nothing except the right to live, and the assurance that, when we put money, either our own or that which we will influence to go into the industries we represent—that when we put that money into the industries it is going to be treated fairly and honestly. And gentlemen, those of you who are actively engaged in public service, let me call to your attention the fact that we have one of the strongest powers of public information in our hands. Let us electrify the men and women of the industry; let us, as nearly as possible, teach the people in all branches of this industry some of the fundamental facts. How many of you, if you were to make a census among yourselves and the men of your employ, know the difference between a rotary generator and an ordinary motor? How many of your own employes, in your offices, have ever been in a power plant? How many of them can talk the language? How many of them can explain what a kilowatt is, a kilowatt-hour—all of these terms that we talk about and which, to the ordinary man, are Greek? We are making the effort, in the National Association, to acquaint the public, through this little "kilowatt series" which some of you have seen, with the meaning of the ordinary terms of the industry, to dispel the mystery in the minds of many people about this business of ours, and to make them understand, just as readily as they understand pounds and ounces, what we are dealing in.

All business is founded upon confidence, and the foundation of confidence is truth. I have preached from this text at various gatherings, and I do not think that it will be out of place to repeat it here before you men. We should be scrupulously careful in every statement we make to the public. Every statement we make for publication should be carefully examined so that it will contain but one meaning. Never put out before the public anything with any Ethiopian in it anywhere. Let us solve the problem of educating the people we are serving. Therein lies the greatest possible security for us. As Mr. Edgerton has said, we may do this and we have done it in many cases.

It is not sufficient simply to convince the regulating bodies of the justice of our cause. We must go farther; we must convince the people we are serving so that in time it may come to pass that the general public will consider the men engaged in public service at least ordinarily honest. That is an ideal that we ought to strive to attain.

The University Ideal and the West

DAVID P. BARROWS

(The president of the University of California took up the part played by the universities in forwarding Western electrical and industrial development, not only in the training of engineers but in the fostering of those ideals which lie behind Western growth and make it a real power in the progress of the civilized world.—The Editor.)

I should like to venture to say, ladies and gentlemen, first, that not only on my own behalf, but on behalf of my colleagues of Stanford University and the University of California, we are very sensible to the privilege of being here with you tonight. It is a distinction to us to find our names arranged here with yours. Men from academic retirement, we like to plunge into these business affairs once in awhile. I think it was fine of Mr. Bob Sibley to let us stand up, at the beginning of this banquet, and sing "America." But why, may I ask, were we told to stop at the first verse? Because the real heart of the song, so far as this company is concerned, is not found in the first verse, but in the second, in that vibrant line, "I love thy rocks and rills." It is because America has some rocks and rills that this company is enthusiastic about America. Why not, then, sing about it?

DAVID P. BARROWS

President, University of California, noted educator and economist, said: "We members of Western states must work together. The University of California aspires to help in this process of unification. You have in Journal of Electricity and Western Industry the means of bringing the news of your profession to the attention of the public."

Thirty years ago I lived at the foot of a mountain where one of these very early enterprises of power and transmission was developed. I realize that it was then, and probably still is, an adventurous business, a sporting proposition. It took courage and it took vision to do this thing. You developed a profession that has seen something that others have not seen. Long ago Shakespeare, on the banks of the tumbling Avon—I think the Avon tumbles a little here and there, anyhow there is water in it—on the banks of tumbling Avon, or some other advantageous spot, saw this company and recited of it as "men who saw sermons in stone and electric power in running brooks and good in everything."

So here you are. You have developed a great industry and a great profession that all of us, even those outside of it, regard with wonder and with great admiration, and we are very proud of it because it has come out of the West. The West gave you the opportunity which you have so wonderfully

utilized. Yet we will presently, I think, cease to think of it in local terms primarily, and I think we will see that the West has here produced a great industry and a great profession which is probably the key, the solution to something even greater than the development of the West. It is the key to the prostration of Europe.

Europe has several things the matter with it, but one thing is scarcity of fuel, the absence of sufficient power. The mills and factories of Europe are largely inert because there is not power. Anyone who has followed the course of recent controversy in Europe since the Armistice must be impressed with the fact that much of that contention and much of that bitterness centers around coal.

Take the worst country of them all, Austria. Austria has a very skilful, highly trained artisan population. She has, within her reduced confines, some very fine plants, but there is not any power. But the water of the great Austrian Tyrol is hers, and if she could get going again, if she could apply to her situation this great industry of the West, she could probably restore herself and supply power, not only for her own needs, but for a large part of Eastern Europe. I do not think it at all an undue California boast to say that the West has probably contrived a solution for European prostration. The thing to do is to work it out.

Our universities here are, of course, interested in this profession. We aspire to help in its advancement. We have turned out some good engineers. We have men on our faculties in engineering who have your respect and your regard. We want to do more for you. Speaking for the University of California, I wish we could greatly augment the resources of our faculty of mechanical engineers. I am conscious of the fact that they by no means have enough to meet your expectations and to meet the opportunities. I hope we can do something towards giving them what they require. And I hope that in this, as in other things which we pursue, we may assist in something which is represented here in this company, namely, the gathering together of the forces of the West for mutual advantage, for mutual strength and for the exertion of an influence which belongs to us. We are few in numbers compared with the eastern portions of the country. We will never exercise our due influence upon the fortunes of this continent except as we, members of Western states, understand one another and work together. The University of California aspires to help this process of unification. You have here this fine organ in the Journal of Electricity and Western Industry. You have its zealous editors, the chief of those editors a former colleague of ours at the University of California. You have the means to bring the news of your profession to the public attention. We aspire to help a little in doing so, and to train up some good engineers. You have not begun to send your representatives wide yet, but you will. In this I trust that our two universities here represented tonight may have their proper share.

REPRESENTATIVES OF WESTERN INDUSTRY

Following is a list of the guests who were present at the celebration of the 35th anniversary of Journal of Electricity and Western Industry, San Francisco, February 1st, together with notations of the activities which they represented:

Addison, Dr. Thomas A., San Francisco, Pacific Coast Manager General Electric Company.
Electrical Manufacturers.

Alexander, I. W., Fresno, Manager, Stock Sales Department, San Joaquin Light & Power Corporation.
Utility Stock Sales to Consumers.

Alvord, R. M., San Francisco, Manager Supply Department, General Electric Company.
Electrical Supplies and Distribution.

Anderton, J. H., San Francisco, Stone & Webster.
Hydroelectric Construction.

Baker, C. G. A., San Francisco, President, Baker-Joslyn Co.
Non-Association Electric Supply Jobbers.

Balch, A. C., Los Angeles, Vice-President, San Joaquin Light & Power Corporation.
Development Natural Gas in West.

Ballard, R. H., Los Angeles, Vice-President and General Manager, Southern California Edison Co.
National Electric Light Association.

Balzari, R. A., San Francisco, Electrical Engineer, Westinghouse Electric & Manufacturing Co.
Development of New Safety Orders and Legislation.

Banta, C. A., San Francisco, Vice-President, Wells-Fargo-Nevada National Bank.
Banking Cooperation in Industry.

Barrows, David P., Berkeley, President, University of California.
Development of University Education in the West.

Baum, Frank G., San Francisco, Consulting Engineer.
Consulting Electrical Engineers of the West.

Beach, Capt. Edward L., Mare Island, Commandant, Mare Island Navy Yard.
Naval Construction on Pacific Coast.

Berry, W. S., San Francisco, Pacific Coast Sales Manager, Western Electric Co.
Cooperative Sales of Public Utility Securities.

Bibbins, T. E., San Francisco, President, Pacific States Electric Co.
National Electric Supply Jobbers' Association.

Black, James B., San Francisco, Sales Manager, Great Western Power Co.
Commercial Power Sales Development.

Boone, W. P., Berkeley, President, California Irrigation Board.
Irrigation Development.

Booth, F. E., San Francisco, President, F. E. Booth Co.
Pacific Coast Fish Industry.

Bostwick, Henry, San Francisco, Manager, San Francisco District, Pacific Gas & Electric Co.
Pacific Coast Gas Association.

Boyd, Frank E., San Francisco, Manager, Small Motor Department, General Electric Company.
Industrial Motor Load Development.

Brackenridge, W. H., Los Angeles, Vice-President, Southern California Edison Co.
Southern California Edison Co.

Breyer, Samuel T., San Francisco, President, San Francisco Advertising Club.
The Power of Advertising in Industry.

Britton, John A., San Francisco, Vice-President and General Manager, Pacific Gas & Electric Co.
Dean of the Electrical Industry.

Campbell, Dr. W. W., Mt. Hamilton, Director, Lick Observatory.
Astronomical Research.

Carman, E. S., New York City, President, A. S. M. E.
The Engineer in National Economic Development.

Chamblin, Clyde L., San Francisco, President, California Association of Electrical Contractors and Dealers.
Electrical Contractors and Dealers.

Cone, D. I., San Francisco, Electrical Engineer, Pacific Telephone & Telegraph Co.
Technical Research in Industry.

Cory, C. L., Berkeley, Dean, College of Mechanics, University of California.
Development of Electrical Engineering Education.

Creed, Wigginton E., San Francisco, President, Pacific Gas & Electric Co.
Pacific Gas & Electric Co.

Dailey, Benjamin, San Francisco, President, Foreign Trade Club.
Development of Pan-Pacific Trade.

Davis, R. J., San Francisco, Century Electric Co.
Early Days of Pacific Coast Technical Journalism.

DeRemer, J. G., San Francisco, Consulting Engineer.
Industrial Research.

Derleth, Chas. J., Berkeley, Dean, College of Civil Engineering, University of California.
Civil Engineering Education in the West.

Dodge, D. W., San Francisco, Lakewood Engineering Co.
Highway Construction.

Downing, Paul M., San Francisco, Pacific Gas & Electric Co.
Hydroelectric Construction and Operation.

Drum, John S., San Francisco, President, Savings Union Bank & Trust Co.
Extension of Foreign Banking.

Dutton, W. G., San Francisco, President, California Development Board.
Industrial and Agricultural Development.

De Young, M. H., San Francisco, Publisher, San Francisco Chronicle.
San Francisco Chronicle.

Edgerton, E. O., San Francisco, Legal and Financial Counsellor.
Western Advance in Utility Regulation.

Edmonson, W. R., San Francisco, Pacific Coast Manager, Western Union.
The Telegraph as a Factor in Industrial Development.

Elliot, Albert E., San Francisco, Secretary, Pacific Division.
National Electric Supply Jobbers' Association.

Elliott, Edw. S., Los Angeles, Vice-President, Security Trust and Savings Bank.
The Banking Viewpoint in International Relations.

Eltringham, Robert, San Francisco, Secretary, California Electrical Co-operative Campaign.
Cooperative Helpfulness in Industry.
Field, Charles K., San Francisco, Publisher, Sunset Magazine.
Pacific Coast Periodical Publishers.
Fisher, R. Earl, San Francisco, Chairman, Commercial Section Pacific Coast Division, National Electric Light Association.
Commercial Development of Electrical Industry.
Fleishhacker, Mortimer, San Francisco, President, Great Western Power Co.
Great Western Power Co.
Fowler, F. H., San Francisco, Hydroelectric Engineer, United States Forest Service.
United States Forest Service.
Fowler, W. H. B., San Francisco, San Francisco Press Club.
Press Associations as a Factor in Development.
Francis, Ira, San Francisco, President, John A. Roebling's Sons Co. of California.
Electric Wire and Cable Manufacturers.
French, Will J., San Francisco, Chairman, California Industrial Accident Commission.
Industrial Accident Prevention.
Gerrie, John H., San Francisco, Publisher, San Francisco Bulletin.
San Francisco Bulletin.
Gough, Emil, San Francisco, Managing Editor, San Francisco Call.
San Francisco Call.
Griffith, Franklin T., Portland, President, Portland Railway Light & Power Co.
Hydroelectric and Industrial Development in Northwest.
Grunsky, C. E., San Francisco, Vice President, A. S. C. E.
The Engineer in Civic Development.
Haegelin, Roscoe F., San Francisco, President, San Francisco Rotary Club.
The Business Club in Industrial Development.
Hanscom, W. W., San Francisco, Consulting Engineer, San Francisco Section, A. S. M. E.
Sectional Activities of the Engineer.
Harris, D. E., San Francisco, Advisory Committee, California Electrical Cooperative Campaign.
Development of Cooperative Idea in Business.
Hatfield, H. R., Berkeley, Dean of the Faculties, University of California.
Development of Business Methods.
Hawley, C. B., Salt Lake City, President, Chamber of Commerce.
Commercial and Industrial Development of Intermountain District.
Heise, Carl, San Francisco, District Manager, Westinghouse Electric & Manufacturing Co.
Electrical Manufacturers.
Hillis, C. C., San Francisco, General Manager, Electric Appliance Co.
Pacific Division, National Electric Supply Jobbers' Association.
Jackson, H. F., San Francisco, General Manager, Great Western Power Co.
Water Power Development in the West.
Jahant, Walter V., Acampo, Tokay Grape Vineyardist.
Users of Power in Agriculture.
Johnson, Walter, Oakland, President, Union Construction Co.
Shipbuilding Industry.
Kelly, Paul B., Berkeley, Economics Department, University of California.
Research Activities in Industrial Cost Accounting.
Kennedy, S. M., Los Angeles, Vice President, Southern California Edison Co.
Los Angeles Chamber of Commerce.
Kerckhoff, W. G., Los Angeles, President, San Joaquin Light & Power Corporation.
San Joaquin Light & Power Corporation.
Leach, F. A., Jr., San Francisco, Vice-President and Assistant General Manager, Pacific Gas & Electric Co.
Public Relations Activities of Utilities.
Lee, Chas. H., San Francisco, President California Water Commission.
Development of Water Resources.
Lisberger, S. J., San Francisco, Electrical Engineer, Pacific Gas & Electric Co.
New Safety Orders and Legislation.
Loring, W. J., San Francisco, President, American Mining Congress.
Development of Mining.
Lowenthal, Max, San Francisco, Globe Commercial Co.
Non-Association Jobbers.
Manuel, Burrell S., San Francisco, General Manager, Electric Railway and Manufacturers Supply Co.
Electric Jobbing Interests.
Marx, C. D., Stanford University, President, Joint Engineering Council of San Francisco.
Inter-Engineering Association Activities.
Mason, David T., University of California, Professor of Forestry, University of California.
Forestry Appraisal Activities.
Meek, W. E., Antioch, Market Produce Grower.
Users of Electric Power for Farm Products.
Meredith, Wynn, San Francisco, Sanderson & Porter.
Consulting Civil Engineers.
Merrill, C. W., San Francisco, Merrill Metallurgical Co.
Metallurgical Development in the West.
Moffitt, James K., San Francisco, Vice-President and Cashier, First National Bank.
Banking Development in the West.
McDonough, J. H., San Francisco, President, California Industries Association.
Industrial Development Organizations.
McElroy, Floyd W., Stanford University, President, Associated Students.
The College Man as a Factor in the Industrial West.
McKee, John D., San Francisco, Chairman, Board of Directors, Mercantile Trust Co.
Growth of Banking on Pacific Coast.
McKee, Paul B., San Francisco, General Manager, California-Oregon Power Co.
California-Oregon Power Co.
Newbert, Lee H., Oakland, President, Pacific Coast Division, N. E. L. A.
Pacific Coast Division, National Electric Light Association.
Noble, G. C., San Francisco, Purchasing Agent, Shell Co. of California.
Petroleum Development in the West.
Oliver, E. L., San Francisco, President, Oliver Continuous Filter Co.
Development of Mining Equipment.
O'Shaughnessy, M. M., San Francisco, City Engineer of San Francisco.
Municipal Enterprises.
Peake, H. G., Oakland, Vice-President and General Manager, Union Construction Co., Oakland.
Engineering Advance in Shipbuilding.
Pitts, H. P., San Francisco, Purchasing Agent, Union Iron Works.
Material Handling in the Shipbuilding Industry.
Rastall, Dr. B. M., San Francisco, Industrial Manager, Chamber of Commerce.
Industrial Research.
Ready, L. S., San Francisco, California Railroad Commission.
Engineering Activities in Utility Regulation.
Reddington, Paul G., San Francisco, District Forester, United States Forest Service.
The Forest Service as an Industrial Asset.
Redpath, James W., San Francisco, Secretary, California Association Electrical Contractors and Dealers.
California Association Electrical Contractors and Dealers.
Richardson, Leon J., Berkeley, Dean of Extension Division, University of California.
Development of University Extension Activities in Industry.
Rickard, T. A., San Francisco, Publisher, Mining and Scientific Press.
Technical Publications of Pacific Coast.
Ryan, Harris J., Stanford University, Professor of Electrical Engineering.
Electrical Engineering Research in West.
Shoup, Paul, San Francisco, Vice-President, Southern Pacific Co.
Electric Railway Development.
Shreve, E. O., San Francisco, President, San Francisco Electrical Development League.
San Francisco Electrical Development League.
Simpson, Tracy, San Francisco, District Manager, Federal Electric Co.
Non-Association Jobbers.
Stern, C. F., San Francisco, Superintendent of Banks of California.
State Bank Development on Pacific Coast.
Taylor, Samuel H., San Francisco, Electrical Railway and Manufacturers Supply Co.
Early Development of Electrical Jobbers Activities.
Thatcher, F. H., Berkeley, President, Chamber of Commerce.
Berkeley Chamber of Commerce.
Van Valer, Claude, San Francisco, Chief Engineer, Commercial Department, Standard Oil Company of California.
Development of Industrial Uses of Petroleum.
Vincent, W. G., San Francisco, Executive Engineer, Pacific Gas & Electric Company.
Valuation Activities in Industry.
Voyer, L. E., San Francisco, Western Manager, Lamp Division, General Electric Company.
Illuminating Engineers of Pacific Coast.
Washburn, F. L., San Francisco, President, Western Meat Co.
Pacific Coast Livestock Industry.
Wishon, A. Emory, Fresno, General Manager, San Joaquin Light and Power Corporation.
Self-Interest Idea in Growth of West.
Wishon, A. G., Fresno, Managerial Director, San Joaquin Light and Power Corporation.
Pioneer Electrical Development.
Woodbridge, J. E., San Francisco, President, San Francisco Engineers' Club.
Engineering Clubs of the West.

LETTER TO THE EDITOR

Lick Observatory, University of California

Mr. Robert Sibley, President,
McGraw-Hill Company of California,
San Francisco, California.

Dear Mr. Sibley:

I desire to acknowledge the satisfaction which attendance at the dinner given by the McGraw-Hill Company on the evening of the first afforded me. The development of Pacific Coast resources is a problem worthy of the efforts of all constructive minds in our midst and you and your Company are entitled to great credit for focusing the minds of the leading spirits upon this problem. Please accept also my congratulations upon the completion of the 35th year of the Journal of Electricity.

Yours sincerely,

W. W. CAMPBELL.

LETTER TO THE EDITOR

Pacific States Electric Company

Mr. Robert Sibley, President,
McGraw-Hill Company of California,
San Francisco, California.

My dear Bob:

The dinner given under your management last night was of special enjoyment and profit to me and must have been to all those who were there.

I am constrained to congratulate you for the courage shown in its undertaking and am persuaded that it will be far-reaching in its effects.

Please allow me to thank you for having included me as one of your guests and to again congratulate you upon the wonderful success.

Yours very truly,

T. E. BIBBINS.

Problem Course in Electricity

BY H. H. BLISS

(Do you know the relation between the output of your generator and the speed at which it runs? Between fuel consumption and efficiency in the engine which drives it? The following article, the fifteenth of a series, will help you in getting the best out of the electrical installation on your farm or in your shop.—The Editor.)

GENERATOR ARMATURES

Drum Winding.—In the early generator the armature was built as a ring and the wire was wound about the metal in a helical coil. This "ring winding" had the disadvantage of being difficult to construct on account of the necessity of pulling the wire through the central hole for every turn, and a still greater disadvantage in that a large proportion of the wire (on the ends and inside the hole) was inactive as regards cutting lines of force, although offering resistance to the flow of current.

The modern direct current armature is treated as a "drum," the winding being put only upon the cylindrical outer surface and the ends. In multipolar machines (with four or more poles) the end connections are comparatively short, so that the greater part of the wiring is active in producing voltage.

In such a winding the part of each coil which runs along the cylindrical surface is called an "inductor," as it is here that the e. m. f. is "induced" by the cutting of the force lines. The inductors are always embedded in narrow slots cut into the metal of the armature core, as this practice enables them to be better insulated and more rigidly held in place against the magnetic forces which tend to disturb them. It also diminishes the air gap between the poles and the armature, since between each two slots there is left a "tooth" which extends from the main body of the armature nearly to the pole faces.

Because these teeth are generally narrower than the slots, particularly at the roots, the flux is unusually crowded in this part of the magnetic circuit, the iron being worked practically at the limit of saturation. Hence in designing the magnets for a generator, a separate computation must always be made for the ampere-turns necessary for driving the flux through the armature teeth.

All but the smallest generators are now built multipolar, and the armatures have either the "multiple" or "series" type of drum winding. In a simple multiple winding the two ends of each coil are connected to adjacent commutator bars and each coil overlaps a number of those near it. From this latter fact this is sometimes known as the "lap winding." The name "multiple" comes from the fact that there are as many sections of this winding in parallel with each other as there are poles in the field.

With the same machine one can obtain higher voltage by using a series winding. The ends of a coil are connected to commutator segments some distance apart, with the result that a drawing of such a winding suggests a succession of waves. This gives the name "wave winding" which is often applied to this type. Irrespective of the number of poles in the field, a simple series winding has but two parallel paths.

Fig. A shows a four pole armature wound in this way. The short radial lines bearing arrow heads represent the inductors, two in each slot, the dotted line indicating the lower one. The inclined lines outside represent the connections between the inductors at the farther end of the armature; similar lines inside the circle of inductors show the connections to the commutator at the nearer end of the armature. Where these lines are dotted the connections run underneath those shown by solid lines. Although each coil is represented as having but two inductors, an actual coil usually includes several turns wound in series through the same two slots and terminating at the commutator segments indicated.

Starting from the "—" brush (which is drawn inside the commutator to avoid confusing the lines)

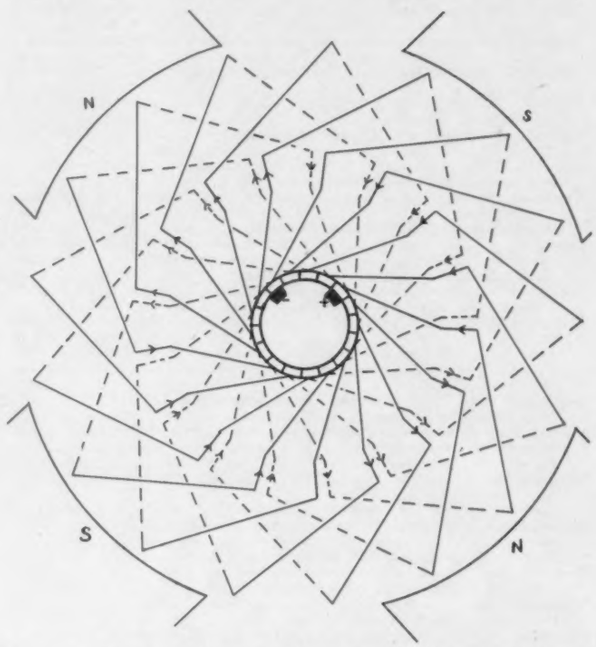


Fig. A.—In this "series wound" armature there are but two parallel paths for the induced current. This winding gives the highest possible voltage for a machine with a given field and a given number of inductors.

one can follow the arrows toward either the right or left through approximately half the inductors to the "+" brush, thus finding that there are two and only two parallel paths through the armature winding. A multiple winding for the same machine would have four parallel paths.

In this figure it will be observed that a certain few of the inductors lack arrow heads. These coils are said to be "undergoing commutation," as they are short circuited by a brush which spans two commutator bars. While the subject of commuta-

tion is reserved for later discussion, it may be noted here that the inductors in question are between the poles and hence have little or no e. m. f. induced in them. An instant later the other brush will also

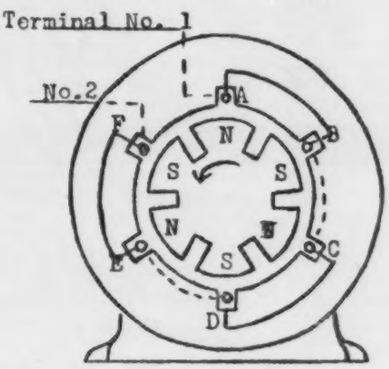


Fig. B.—Six pole alternator with revolving field. The e.m.f. in the inductors near an N pole is directed toward the observer, since the rotor turns counter-clockwise.

be spanning two segments and short circuiting inductors which are between the poles.

Alternator Windings.—A winding for a six-pole alternating generator is sketched in Fig. B. At the instant shown the current is entering the machine at terminal No. 1, coming forward along inductor A, going backward in B, etc., and finally leaving the machine at No. 2. There are no wires in parallel in this winding so that the voltage induced is computed by taking every inductor into account. (Of course there are supposed to be a number of turns in series in each pair of slots, constituting coils of several turns each.) This is a "single phase" winding; most alternators have additional coils for producing currents "out of step" with that in the first winding, but the discussion of such "polyphase" currents is beyond the scope of this paper.

Three Wire Machines.—If in this alternator a third terminal wire were connected between inductors C and D, there would evidently be a voltage between it and each of the other terminals equal to one half the full voltage of the generator. This could then supply a three wire system with alternating current much more simply than by using two separate machines in series. In practice, however, alternating current energy usually goes through one or more transformers between the generator and the load. In such a case the neutral wire is connected to the mid point of the winding of the service transformer. Only two wires are then used from the alternator to the transformer, while three run from the latter to the load.

Fig. C illustrates the armature of a three-wire direct current generator. A third brush, B, connects the neutral wire to a slip ring which turns with the armature and is connected to the mid point of an inductive coil. This coil in turn connects two opposite points of the winding, such as are connected to two commutator bars upon which the main brushes bear simultaneously. Thus there is impressed upon the coil an alternating voltage, but the inductance serves to keep the current normally very small. (The subject of inductance will be discussed in a later chapter.) However, when the three wire load is unbalanced, the current flowing in along the neutral divides in the coil, part flowing toward each end, in which case inductance offers much less opposition to the current.

Some of these generators have two coils at right angles to each other which are connected at their mid points to the neutral collector ring. Other machines have the balancing coil or coils mounted on the switchboard rather than in the armature, being connected to the winding by means of one slip ring for each end of each coil. All, however, operate upon the same principle.

Answers for Previous Problems

157. 12,000 ÷ (.87 × .96) = 14,360 kw., or **19,100 hp.**

158. **23 ohms.**

159. Poles passed in 1 second = 8 × 800/60 = **106.67.** Then 106.67 × 3,000,000/100,000,000 = **3.2 volts.**

160. Volts per turn = 5,000,000/100,000,000 = .05. Then 300 × .05 = **15 volts.**

161. There being 3600 ft. of wire, the ohms = 3.6 × 40.75 = **146.7.** Amperes = 1800/2400 = .75. Total resistance = 120/.75 = 160 ohms; rheostat has 160 — 146.7 = **13.3 ohms.**

162. During one revolution the current reverses as many times as there are poles, or here 4 times per revolution. Speed = 60 × 100/4 = **1500 r.p.m.**

163. Voltage induced in each wire = 2550/144 = 17.7; hence it must cut 17.7 × 100,000,000 lines in 1 second. Since 4 × 1800/60 = 120 poles pass it per second, the flux per pole = 1,770,000,000/120 = **14,750,000 lines.** Checking on formula: 2550 = 4 × 30 × 14,750,000 × 144/100,000,000.

164. Pole: 14,750,000/184 = 80,000, flux density; 20 × 18 = 360 ampere-turns; air gap: 14,750,000/(750 × 3.2) = 6,140 ampere-turns per inch; ¼ × 6140 = 1530 ampere-turns;

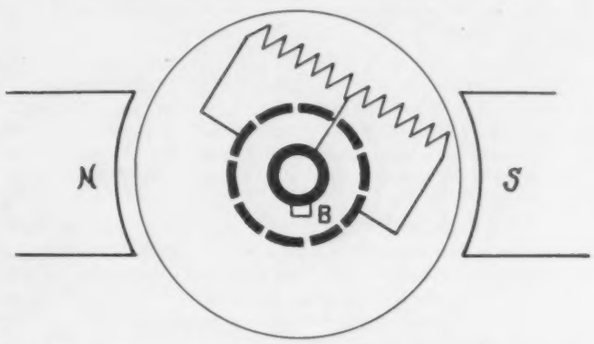


Fig. C.—The balancing coil in a 3-wire d.c. generator is connected between opposite points in the winding; the neutral brush, B, collects from a ring attached to the mid-point of the coil.

armature: 7,375,000 ÷ 67.5 = 110,000, density; 18 × 177 = 3190 ampere-turns. Total = 360 + 1530 + 3190 = **5080 ampere-turns.**

165. Useful flux = 100,000,000 × volts/(poles per second × inductors in series) = 100,000,000 × 120/80 × 200 = **750,000 lines per pole.** Total flux in yoke and poles = 1.3 × 750,000 = **975,000.** Density = 750,000/8.25 = **91,000 in armature;** 750,000/12.4 = **60,600 in air gaps;** 975,000/10.8 = **90,000 in poles;** 975,000/12 = **81,000 in yoke.**

166. Ampere-turns for armature: 4 × 37 = 148; gaps: .04 × 60,000/3.2 = 750; poles: 14 × 43 = 602; yoke: 8.5 × 30 = 255; total = **1755 ampere-turns.**

Problems on Armatures

167. If the armature in Fig. A is 12 in. in diameter and 10 in. long, what is the distance (around the outside of the cylinder) between opposite sides of a coil? Taking this as approximately equal to the length of the "end connection" between inductors, find the length of a coil of 24 turns and the percentage of that length which is active in producing voltage.

168. A large d.c. generator has armature diameter = 50 in., length 25 in., 10 poles, and 6 inductors in each coil. Find the length of the end connections if each is (on account of overlapping of coils) one in. longer than the distance between pole centers measured on the cylindrical surface of the armature. What proportion of the total length of the wire is in the inductors?

169. The leakage coefficient in Problem 168 is 1.2. The e.m.f. induced at 400 r.p.m. is 30 volts per coil. Find the flux in the yoke or frame between two poles.

170. The series winding on a certain compound field has a resistance of .001 ohm and its shunt has .004 ohm. How many amperes flow in the shunt when the line current is 2000 amperes? What is the voltage drop in the series field?

171. The armature teeth in a certain generator are .38 in. wide at the roots and .4 in. wide at the tops. The slots are .45 in. wide and 1.25 in. deep, and the length of the armature is 20 in. If a pole carrying 12,100,000 lines spans 13 teeth, figure the ampere-turns upon it required to send the flux through the teeth. (Use the average width of tooth in figuring section area.)

172. In Problem 171 the air gap is .12 in. long. Taking its area as the mean between the area of the pole face and that of the outer ends of the teeth, find the ampere-turns required to send the flux across it.

173. Which way is the armature of Fig. A rotating to give induced e.m.f. in the direction indicated by the arrows?

174. At what speed must this armature run to generate 32 volts if each pole sends 1,400,000 lines into the armature and if there are only as many inductors as are shown?

175. If with the same pole strength this machine must generate 248 volts at 1300 r.p.m., how many turns should be in each coil and how many inductors in each slot? (All the winding between two successive commutator bars constitutes one "coil"; one "turn" includes two inductors.)

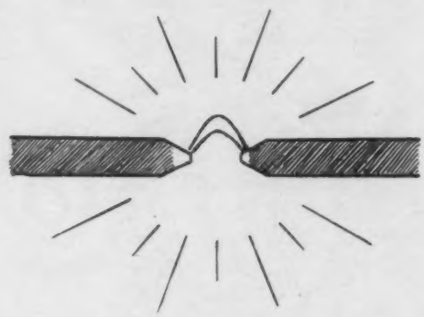
176. In the sketch of the a.c. generator assume that each slot carries 50 inductors instead of one; take the r.p.m. = 1200 and find the cycles per second and the flux per pole if the average voltage is 100. (One "cycle" of alternating current includes two reversals of direction; the word indicates what occurs in the circuit while an inductor is passed by two poles.)

177. Find the efficiency of a generator which delivers 6 kw. to the line when driven by a 10-hp. engine. Working at the same efficiency this machine delivers 40 amperes at 120 volts for 8 hours. Taking the fuel value of oil at 19,000 B.t.u. per lb., how much is burned in that time in an engine of 30% efficiency which drives the generator?

178. A six-pole three wire d.c. generator has a multiple winding with a total of 384 inductors on the armature. At what speed must it run to give 115 volts between one outer wire and the neutral if a flux of 4,000,000 lines issues from each pole?

ENGINEERS OF YESTERDAY

(Series Compiled by A. L. Jordan)



22. DAVY

What is the origin of the name "'arc' light"?

Humphrey Davy (1778-1829) gave few signs during his school days of a special zeal for knowledge, but when his father died he awoke to his responsibilities as eldest of five children and at the age of 16 apprenticed himself to a surgeon-apothecary at Penzance.

Becoming superintendent of a "Pneumatic Institution" at Bristol he discovered (1799) that nitrous oxide (laughing gas) was respirable and produced a kind of intoxication. He entered the service of the Royal Institution in 1801 and was promoted to professor in 1802, lecturing first on "galvanism," then on agricultural chemistry. In 1806 he published certain laws of electrochemistry, notably that concerning the apparent travel of hydrogen and the metals in the direction of the current during electrolysis. Sodium, potassium and strontium were prepared by this process in 1807. He gave many important lectures, and in one of them (1808) drew attention to the "arch" or arc light between carbon electrodes.

Receiving the LL.D. degree from Trinity College, he was knighted in 1812 and started his continental tour in 1813. With him as experimental assistant went the then unknown Michael Faraday.

The invention of the miner's safety lamp came in 1816 and the magnetization of a steel needle by the electric current in 1820, the latter discovery being shared with Arago and Ampere, however. In 1799 he had shown that two pieces of ice could be melted by friction, even below zero, showing that heat is not a material substance. This confirmed the work of Rumford and helped in "seeing **caloric** interred with **phlogiston** in the same tomb."

PAMPHLETS AND CLIPPINGS IN A BUSINESS LIBRARY

The series of articles, "Pamphlets and Clippings in a Business Library," written for these columns by Miss Virginia Fairfax, librarian for the Carnation Milk Products Company of Chicago, will shortly be issued in pamphlet form to meet the demand from public libraries and business houses.

The pamphlet contains the complete text, together with all the illustrations which appeared with the articles, and some supplementary matter. It will be on sale at the Technical Book Shop, Journal of Electricity and Western Industry, Rialto Building, San Francisco, price 75 cents.

SPARKS—Current Facts, Figures and Fancy

(Do you want to be as famous as Jonah? If so, you have a chance to try it out on Catalina Island. Does your family always offer suggestions while you are telephoning? Are you doing your share in supporting the chewing gum industry? You will be assisted in the solution of these weighty problems by reading this page, and incidentally you will acquire some odd and interesting bits of information.—The Editor.)

Electrical exports from the United States are running at a yearly average of about $94,000,000, a gain of $4,000,000 over those of 1919.

* * *

The chewing capacity of the great American public is partially measured by the fact that a single company makes 25,000,000 sticks of chewing gum a day.

* * *

Twenty-two secondary wireless stations will be installed in Venezuela, according to a recent statement. Many of the contracts have already been awarded to an American.

* * *

The value of aluminum for electrical uses has been increased by a Swiss scientist who is said to have patented a process for giving it the mechanical qualities of bronze, copper and brass without changing its weight.

* * *

In view of the paper shortage recent experiments of the Forest Products Laboratory should be interesting. These indicate that one cord each of loblolly pine and red gum will yield a ton of paper at a comparatively low cost.

* * *

Jonah's solution of the housing problem is being tried out with success on Catalina Island. An enterprising contractor has transformed the discarded skeleton of a whale into a perfectly respectable shelter by the simple process of adding canvas, wallboard and flooring.

* * *

Electric traction might be a help to the natives of Madeira, where the driver seems to work a great deal harder than the beast of burden. The ox-carts have runners instead of wheels, and the driver spends most of his time running ahead smearing the cobblestones of the road with grease.

* * *

A new method of fireproofing wood has been evolved, according to a recent statement. It consists in submitting the wood in a closed cylinder to a steaming vacuum treatment, which removes the air and moisture in the pores of the wood and vaporizes the sap water. The wood is then impregnated under hydraulic pressure with a solution of fire-resisting chemicals, which replaces the elements driven out by the preliminary treatment. Finally the water of the solution is dried out, leaving the wood impervious to fire.

California industries are bent on keeping up the state's reputation for being the "home of the prune, the lemon, and the nut"—at least the prune. Five million dollars is the annual value of the prune crop of California, which leads all other states in the production of plums and prunes.

* * *

Keeping your family's helpful comments out of your telephone conversations is an ideal which may soon be realized. A new telephone has been developed in London, with a transmitter which gathers up the vibrations direct from the throat instead of the lips, and transmits no external noises.

* * *

The newspaper cause for most fires is "defective wiring." A recent investigation, however, shows that only 2.57% of the fires in the United States are caused by electricity, and most of these are due to carelessness such as leaving the electric iron on. Three times as many fires are caused by the careless throwing down of matches and cigarette stumps.

* * *

Perfect safety may now be secured in aviation. It is done by eliminating the pilot—and presumably the passengers—entirely, and guiding the plane by wireless. Of course we don't know what is the good of an uninhabited airplane, wandering around the sky, but the invention is in dispute between an American and a Frenchman, so there must be something in it.

* * *

America is the largest exporter of eggs in the world. During the last fiscal year this country exported eggs of a value of $19,400,000. This compares with $14,000,000 exported by China. The eggs produced in the United States last year were 1,590,000,000 dozen, valued at over $306,000,000. Petaluma, California, which is responsible for a large proportion of this supply, is commonly known as "The World's Egg Basket."

* * *

The longest telegraph wire in the world has recently been put into use by the Western Union Company. It stretches from New York to Seattle, a continuous copper strand 3,380 miles long, grounded at both ends. This gives instant communication between the two cities. Modern multiplex devices are used, so that four messages each way can be sent at the same time. The wire weighs over 200 pounds to the mile and cost about $125,000. Other materials and labor cost nearly a quarter of a million.

PERSONALS

E. A. Palmer has been appointed manager of the Railway Division of the San Francisco office of the Westinghouse Electric & Manufacturing Co. Mr. Palmer is a graduate in mechanical engineering, Cornell University, and was first employed in the Erection Department of the Westinghouse Company at East Pittsburgh. In 1910 he entered the employ of the Public Service Railway Company of Newark, N. J., as Division Master Mechanic. In 1916 he became affiliated with the American Brake Shoe and Foundry Company of New York City as Mechanical Expert. In 1917 he re-entered the employment of the Westinghouse Company, specializing on railway engineering, and within a few months was transferred to the San Francisco office. He is a member of the American Institute of Electrical Engineers and of the American Electric Railway Association.

G. E. Groesbeck, vice-president of the Electric Bond and Share Company, and his secretary, **L. J. Muir,** were in Salt Lake City during the early part of January.

Otto B. Frank, formerly general manager of the Douglas County Light & Power Company of Roseburg, Oregon, is a recent San Francisco, Fresno and Los Angeles visitor.

E. A. Holbrook, assistant director of the U. S. Bureau of Mines, and **H. E. Meyer,** chief clerk of the Bureau of Mines, spent several days in California during January and visited the San Francisco office of the Bureau.

John L. McNab has been engaged by the California State Association of Electrical Contractors and Dealers to act as attorney and legal adviser for the association. Mr. McNab succeeds **Albert Elliot,** who recently resigned.

George Ellery Hale, director of the Mount Wilson Astronomical Observatory near Pasadena, has been awarded the Actonian prize by the Royal Institution of Great Britain, in recognition of his work in studying solar phenomena.

Mortimer Fleishhacker, president of the Great Western Power Company, has been appointed a member of the committee to pass on the offer made by the Western Pacific Railway for the securities of the Sacramento Northern Railway.

Frank G. Baum, consulting engineer for the Pacific Gas & Electric Company with headquarters in San Francisco, is spending several weeks visiting eastern business centers on the subject of insulator research for 220,000-volt transmission lines.

Martin J. Insull, president of the National Electric Light Association, has recently telegraphed to Journal of Electricity and Western Industry that the forty-fourth annual convention of that society will be held at the Drake Hotel, in Chicago, from May 31 to June 3.

A. R. Elliott, formerly assistant petroleum engineer of the U. S. Bureau of Mines, with headquarters at the San Francisco office of the Bureau, has resigned from the Bureau to accept the position of chief draftsman with the Pierce Oil Corporation at Oklahoma City, Oklahoma.

Michael I. Pupin, professor of electro-mechanics at Columbia University and past chairman of the Engineering foundation, will be awarded the Edison Medal for his work in electrical engineering, at the annual convention of the A. I. E. E. in New York on February 16.

D. F. Henderson, of the firm of Austin-Henderson, electrical contractor-dealers of Spokane, was recently elected president of the Associated Engineers of that city. Mr. Henderson was formerly assistant superintendent of Light and Power with the Washington Water Power Company.

Charles B. Hawley, formerly assistant hydraulic engineer, the Aluminum Company of America, has recently entered private practice with offices at Washington, D. C. Mr. Hawley has been responsible for the design of some of the largest and most noteworthy hydroelectric developments in the East. He has also done important engineering work abroad.

F. N. Averill, president of the Fobes Supply Company, was recently elected chairman of the Pacific Division of the Electrical Supply Jobbers' Association, at their recent convention at Del Monte. Mr. Averill is chairman of the finance committee of the Northwest Electrical Service League and is well known in the Northwest for his active interest in association work.

Theo. S. Dredge, Pacific Coast representative of the Richardson-Phenix Company, is back again in San Francisco after a visit of several weeks in the East. Mr. Dredge reports that **C. H. Bromley,** formerly associate editor of Power, well known to Pacific Coast men, is now associated with the home office staff, bearing the title of "Technical Director."

John Hunter, well known power plant engineer, has just accepted the position of chief engineer of the Heine Safety Boiler Company. Mr. Hunter has a national reputation in the central station and power field, and his entry into a position where he can bring his experience to bear on the design and operation of central stations throughout the country will be of interest to his many friends.

Allen E. Ransom, well known throughout the Pacific Northwest because of his past association with the Westinghouse Electric & Manufacturing Company and various engineering projects in that vicinity, has recently been made superintendent of the Olympia Light & Power Company at Olympia, Washington. He served two years in France as captain and major commanding engineers, U. S. A. E. F., and since returning from France has been export sales engineer for the Westinghouse International Electric Company, with offices at New York and Pittsburgh.

John Hood, who has been engineer of the San Francisco office of the General Electric Company for the past eight years, has gone to Honolulu to become assistant manager of Catton Neill & Co., Ltd. Mr. Hood entered the University of California in 1906, after spending several years in radio work and power plant construction. Immediately after his graduation in 1910 he entered the engineering department of the General Electric Company. The Catton Neill Company, which is one of the largest engineering firms in the Hawaiian Islands, in addition to manufacturing sugar, milling and boiling equipment, holds the insular agencies for the General Electric Company, the Pelton Water Wheel Company, the Ingersoll Rand Company, and the Pacific States Electric Company.

James S. Walker, Jr., president of the Walker Electric Supply Company, of Salt Lake City, has recently been elected president of the Contractor-Dealers' Association of that city. Mr. Walker was one of the first members of the Contractor-Dealers' Association, and is an enthusiastic worker for its interests and for the interests of the electrical industry in general. He is also a member of the executive committee of the Rocky Mountain Electrical Cooperative League. Mr. Walker will head one of the most successful contractor-dealer associations in the United States, as practically every contractor-dealer in Salt Lake City is an active member of the organization. The cooperation thus assured in this branch of the industry should greatly facilitate the work of the Rocky Mountain Electrical Cooperative League, especially since Mr. Walker is actively concerned in the directing of the policies of these two important organizations.

Wells Drury has announced his active entrance into the advertising business in San Francisco as head of the Drury Service.

J. R. Veach, of Seattle, assistant traffic manager of the Chicago, Milwaukee & St. Paul Railway, spent several days in Butte during the first week of February.

Stephen O. Hayes, electrical engineer of the Westinghouse Electric & Manufacturing Company, left San Francisco for Australia February 1, on business.

L. Wood Davis, branch manager of the Westinghouse Lamp Company at Los Angeles, visited San Francisco after attending the Jobbers' Convention at Del Monte.

W. A. Furst, general engineer of the Westinghouse Electric & Manufacturing Company of East Pittsburgh, was in San Francisco on business during the first part of February.

J. G. Rollow has resigned his position with the E. I. du Pont de Nemours & Company, and is now connected with the Los Angeles Gas and Electric Corporation as a consulting engineer.

William J. Collonan and **John F. Nugent,** transacting business in San Francisco under the name of the Reliable Electric Fixture Company, have dissolved partnership by mutual consent.

Robert Robertson has joined the staff of The Society for Electrical Development in the Special Service Department. Mr. Robertson was formerly with the Winchester Repeating Arms Company.

B. T. McBain, who for a number of years has been resident manager of the Crown Willamette Paper Company, has resigned his position and will probably enter other lines of business in Portland in the near future.

Harry J. Billica, district line materials manager for the Western Electric Company, is now on an extended business trip through the East, stopping at Chicago, Washington, New York and other points. He is expected to return about April first.

F. E. Johnson, Jr., vice-president and general manager of the M. W. Kellogg Company of New York, manufacturers of high pressure pipe, is visiting the Pacific Coast in the interests of his company. Mr. Johnson is very much impressed with the industrial activity and development with which he has come in contact on his visit.

Markham Cheever, general superintendent and chief engineer of the Utah Power & Light Company, attended the meetings of the Hydraulic Power Committee of the Technical Section of the N. E. L. A. held at New York beginning January 17. Mr. Cheever also attended the Symposium on Hydroelectric Development and Distribution, held at Philadelphia on January 21 under the auspices of the Engineers' Club of Philadelphia, and the local sections of the A. S. M. E. and A. I. E. E.

Carl A. Heinze, assistant electrical engineer for the Los Angeles Bureau of Power and Light, has been elected president of the local chapter of the American Association of Engineers. Other officers are: first vice-president, **H. Z. Osborne, Jr.,** chief engineer, Los Angeles board of public utilities; second vice-president, **Myron Hunt,** architect; treasurer, **E. H. Merrill**; secretary, **Willis S. Peffer. Frank H. Joyner,** the retiring president, was presented with a gold watch-fob. The chapter now has a membership of 860.

Alfred J. Cleary, chief assistant city engineer of San Francisco, has resigned to enter private practice as a consulting engineer. Mr. Cleary has opened offices in San Francisco and will undertake general construction work with special attention to the hydroelectric field. Mr. Cleary entered the employ of the city engineering department twelve years ago, as an inspector, and worked up through the various grades. During the years in which the Hetch Hetchy project has been under construction Mr. Cleary has been in entire charge of the work, reporting directly to M. M. O'Shaughnessy, city engineer. **Nelson A. Eckart** has been appointed chief assistant city engineer, succeeding Mr. Cleary.

Robert G. Sproul has been appointed comptroller of the University of California. Mr. Sproul has been a prominent Californian ever since his 1909 freshman year. Upon his graduation from the engineering department of the university he entered the employ of the Civil Service Department of Oakland, carrying on work known as efficiency engineering in various departments. He left this work to become cashier in the office of the comptroller of the university, a position which he held from 1914 to 1916, at which time he was named assistant comptroller under Ralph P. Merritt. The ability of the engineer to succeed in any line of endeavor is evidenced in this advance of a man who has entered a field entirely different from the one to which his college training leads.

OBITUARY

John Frederick Diehl, president of the Santa Barbara Electric Company and prominent in business and civic affairs in that city, passed away on the night of February 4th, after a long illness. Mr. Diehl was born in Missouri in 1864 and took up his residence in Santa Barbara in 1881. In the thirty years that followed, he built up one of the finest grocery stores in the West. For many years he was president of the Santa Barbara Gas and Electric Company, now known as the Santa Barbara Electric Company. He is survived by Mrs. Diehl, a son and a daughter, two brothers and three sisters.

Builders of the West—XCV

THE keeping of accounts is one of the earliest recorded business practices. There is no telling when the first savage kept the tale of his barterings with shiny pebbles or with nicks in a wand, but every early civilization sufficiently advanced to leave legible records had its own accounting methods which have been preserved somewhere among its relics. The Babylonians scratched the record into clay in cuneiform figures; the Incas tied it with complicated meaning into knots in a string.

The double entry book system and the analysis of figures by which the accountant of today can set the entire essentials of a business before its owner, putting into his hands the records of the past as a chart for the future—these are an inseparable link in the chain of successful business today. The merchant must buy well, he must sell well, and he must know where he stands. To Henry R. Hatfield, Dean of the Faculties of the University of Californit, in recognition of the importance of the work which he has carried on as an educator and as a leader of thought in this field, this issue of Journal of Electricity and Western Industry is dedicated.

HENRY RAND HATFIELD

Dean of the Faculties and Professor of Accounting at the University of California, whose work in the science of accounting has made an important contribution to the business life of the West, and has done much to bring the university world into closer touch with industrial development.

Professor Hatfield was born in Chicago, and entered Northwestern University in 1885. At the end of two years he left to become associated with a municipal bond house in Chicago, returning to college in 1891 and graduating in 1892. In 1897 he obtained the degree of Ph.D. at the University of Chicago where later he became instructor in political economy.

Asked how he came to specialize in accounting, Professor Hatfield disclaims anything so picturesque as an "inner urge," and says it was an accident. The authorities decided that business courses should have a place in the University curriculum, and he was called upon because of his previous business experience.

When he came to California in 1904, it was not, he says, to satisfy an irresistible longing to "go west, young man, go west," but to become professor of accounting at the University of California. But in spite of his disinterested reasons for coming west, he is now an entirely satisfactory convert. Judging by some of the snapshots that are extant, he becomes as perfect a hobo in the High Sierras as any native son, and various tempting offers have not sufficed to lure him away from the regions where such things can be easily combined with accounting. From a certain readiness with quotations we suspect him of another hobby—an indulgence in light literature of the type of the nonsense novels written by his famous contemporary, Stephen Leacock. There seems to be some subtle relationship between the study of economics and a taste for burlesque.

To return to more sober facts. In 1909 Professor Hatfield was appointed Dean of the College of Commerce, holding that position until his recent appointment as Dean of the Faculties. During the war he served as director of the Division of Planning and Statistics of the War Industries Board and was active in many other lines of public work. He was elected president of the American Association of University Instructors in Accounting in 1918, and vice-president of the American Economics Association. He also served as expert for the Advisory Tax Board in 1919.

In speaking of the development of accounting, he points out that the trend of modern business has made it not only of increasing importance, but an absolute essential. The growth of large corporations, the complexity of taxation, and such developments as public regulation—all these have created a condition which did not exist in the days when two partners could keep their accounts in their vest pockets. Business today is on a scientific basis, the machinery of which is proper accounting. It is well known that numbers of small dealers owe their failure to their ignorance of cost accounting, and in his research work in this field Dr. Hatfield has rendered an inestimable service to the electrical industry.

Dr. Hatfield's volume, "Modern Accounting," is one of the standard works on accounting, and his specialization has brought him to the position of one of the foremost authorities on the subject in the country.

Side by side with all achievement of the best kind grow new ideas and the desire for further work. To anyone sufficiently importunate Dr. Hatfield will divulge the fact that he wants to write another book—a book analyzing the nature of profits from the legal, economic and accounting standpoints. Since modern progress revolves around business, and business revolves around profits, the significance of this type of study needs no further emphasis. Nor is there anyone better fitted to carry on the work than the man who was the first member of an academic faculty to hold the title of Professor of Accounting.

HAPPENINGS IN THE INDUSTRY

(The next annual convention of the N. E. L. A. will be held in Chicago, according to an announcement by the president. San Francisco engineers condemn Marshall Plan. Two new industries announce bond issues. A. S. M. E. branch to be established in Spokane.—The Editor.)

The Society for Electrical Development has sent out several large colored posters, calculated to inculcate a spirit of optimism throughout the country.

SAN FRANCISCO ENGINEERS CONDEMN "MARSHALL PLAN" AS PHYSICALLY AND FINANCIALLY IMPOSSIBLE

Solution of the irrigation and reclamation problems of the Sacramento and San Joaquin valleys through the proposed vast engineering scheme that has become known as the Marshall plan, is held to be "physically, legally and financially impossible of accomplishment" by the San Francisco section of the American Society of Civil Engineers.

A special meeting to discuss the feasibility of the project, which is proposed by Colonel R. B. Marshall, formerly of the United States Geological Survey, was held in San Francisco on February 4 and resolutions, including the following, were adopted:

"That the Marshall plan obviously is physically, legally and financially impossible of accomplishment and the move to promote it or any consideration of it by the legislature, directly or indirectly, may prove inimical to the public interest by delaying or diverting attention from urgently needed and immediately feasible land development work.

"That it is the sense of this meeting of the San Francisco section of the A. S. C. E. that if the legislature deems it wise to appropriate any money for investigating the water problems of the state, that such investigation be general, that such sums be expended by the state engineering department and other related and existing state agencies, and that no appropriation be made for the investigation of any particular project or scheme."

NEXT N. E. L. A. CONVENTION TO BE HELD IN CHICAGO

The forty-fourth annual convention of the National Electric Light Association will be held at the Drake Hotel, in Chicago, according to advice recently received from Martin J. Insull, president of the Association. This announcement comes as somewhat of a surprise due to the fact that it has been rumored that Arkansas Hot Springs would be the probable meeting place of the next convention.

PORTLAND FLOURING MILLS FIRST MORTGAGE BONDS

The Portland Flouring Mills Company has recently issued three million dollars of first mortgage 8% 15-year sinking fund gold bonds, which will mature on February 1, 1936. The bonds are issued in the denominations of five hundred and one thousand dollars.

The Portland Flouring Mills Company was incorporated under the laws of the state of Oregon, December 9, 1884. The business of this company has shown a gradual and continuous development until today it is the largest manufacturer of flour in the Northwest. Over 60% of the company's business is domestic.

The company does an excellent foreign business with the Orient, the Philippine Islands, the United Kingdom, Holland, Belgium, Norway, Sweden and Denmark. The company also enjoys a splendid business with Central-South America and the Hawaiian Islands, where its products are handled respectively by the well-known firms of Otis, McAllister & Co., and American Factors, Ltd.

The Portland Flouring Mills Company has eleven plants located in the states of Oregon and Washington, with the three principal plants at Portland, Tacoma and Everett, with a capacity in excess of 10,000 barrels of flour daily.

Over 70% of the company's output is represented by the straight milling of flour. Their new cereal plant, located at Portland, is reputed to be the most modern and complete cereal and feed plant possible to construct.

CONSUMERS PETITION FOR RATE INCREASE IN MONTANA

Rather than lose the electric lighting service in Drummond, Montana, patrons of the Drummond Light and Power company have petitioned the Montana Public Service Commission to increase the rates of the utility. This is the first time since the commission has been created that patrons have petitioned for increase in rates. They ask that the increase be temporary to enable the utility to meet operating expenses. The new rates are to be twenty cents for the first twenty-five kilowatts, with a minimum charge of $3.50 per month.

REGISTRATION OF ENGINEERS REQUIRED IN BRITISH COLUMBIA

An act recently passed by the legislature of British Columbia incorporates the Association of Professional Engineers in that Canadian province and requires that all persons practicing as "professional engineers" shall register as members of this body. Civil, mining, mechanical, electrical, chemical and structural engineers come within the provisions of the act, but not architects. Those who had practiced in the province for five years prior to the passage of the act may register without an examination up to April 1, 1921, as many engineers who served as such during the war. Temporary licenses to practice may be given to non-residents of the province. An executive council for the association is to be elected by the membership, and this council is to appoint annually a board of examiners which shall examine candidates for membership. The annual fee is to be determined by the association when it draws up its by-laws.

ELECTRO-METALLURGICAL PLANT TO BE INSTALLED NEAR EUREKA

A large electro-smelting plant is to be established shortly at Trinidad, California, together with large hydro-electric plants at Ishi Pishi Falls and below Orleans, according to advice received from the Electric Metals Company of San Francisco. With the water power it is proposed to generate electricity, which is primarily for the purpose of transmission to the port of Trinidad, where it is to be used in the electro-metallurgical industry. The sale of power, should the demand arise, is also a possibility, but it is not the intention of the company to engage in the power business.

PORTLAND IS VICTOR IN RATE CASE

Portland's contention that it is less costly to the railroads to haul over the water grade to this city than over the mountain grades to Puget Sound points has finally been given recognition in the form of an order handed down by the Interstate Commerce Commission, in the Columbia Basin rate case.

In the territory won, which is one of the richest of the Northwest, there are about 15,000,000 bushels of wheat, considerable quantities of barley and oats, livestock and fruit and a good general trade. About 4500 square miles of territory has been brought into the exclusive Portland rate district, making the trade territory on a less rate to and from tidewater about 160,000 square miles, as compared to about 35,000 miles for all of the Puget Sound cities.

IMMENSE NEW FACTORY FOR PORTLAND

With the $700,000 capital fully subscribed, and a site selected, the Portland Vegetable Oil Mills Company will begin construction of its immense oil refinery plant immediately. The plant will be located on the site of the Foundation shipyard at 22nd and Nicolai streets, which was recently purchased by the company. The vegetable oil industry is dependent upon the shipments of copra from foreign lands, and through the establishment of this industry, the imports of the port will be increased many millions each year, thus helping to establish a balance between exports and imports.

NAVAL OFFICER GIVES INTERESTING LECTURE BEFORE ENGINEERING SOCIETY

Lieut. L. Dee Miller, who was on the transport Leviathan for two years, during which time nineteen round trips were made across the Atlantic, addressed the San Francisco Chapter of the American Association of Engineers on February 21. Lieut. Miller described the vessel and the difficulties encountered in getting her ready to operate. He told of the ingenuity with which the Germans attempted to permanently disable the vessel, and how American officers pet her in service in record time.

STEAM TURBINE INSTALLATION AT PORTLAND

The Portland Railway Light & Power Company will begin the installation of a 12,500-kw. steam turbine immediately. The set will consist of a Curtis steam turbine, driving an 11,000-volt, 1800 r.p.m. generator, operating under 185 pounds steam pressure with 150 degrees superheat. This turbine will be applied to a boiler plant that is now serving a 7,000-kw. steam generating station, and by reason of higher efficiency will almost double the capacity of the plant. B. & W. superheaters will supply the superheated steam for the new machine. The new unit will be installed at the Station L plant of the company, the present equipment being retained as spare units. It is expected that installation work will be completed by July 1.

CALIFORNIA ELECTRICAL COOPERATIVE CAMPAIGN MOVES HEADQUARTERS

The headquarters of the California Electrical Cooperative Campaign have recently been moved from the Call building in San Francisco to the Humboldt Bank Building. This change was made necessary by the demand for larger quarters incident to the increased work which this office is doing. The scarcity of available quarters in the down-town business section of San Francisco caused Robert Eltringham, executive secretary for the Campaign, to make a canvas of twenty office buildings before finding suitable space, and location.

PACIFIC SERVICE
Employees Association
CALENDAR FOR
1921 - FEBRUARY - 1921
SUN MON TUE WED THU FRI SAT
Watch the BULLETIN BOARDS FOR DETAILS ALL MEETINGS
1 2 3 4 5
6 7
The Florist's Shop HOME CLUB OAKLAND
9 10 11 12
13
15 16 17 18
BIG DIVISIONAL PARTY FRESNO
20 21 22 23 24 25
The Frolic OAKLAND AUDITORIUM
27 28
Apportionment of funds for the year's activities to be made on membership count of March 1st
MEMBERSHIP COMMITTEES - GET BUSY!
KEEP THIS REMINDER ON YOUR DESK
Total Membership January 31st, 2,550—Going up!

NOVEL CALENDAR FURNISHED EMPLOYES

The Pacific Service Employes' Association, which is composed of the employes of the Pacific Gas & Electric Company, gives this type of calendar to its members each month to remind them of the events of interest.

"DO IT ELECTRICALLY"

This Salt Lake Cartoonist has presented the advantages of electricity in rather a novel manner.

PORTLAND COMPANY ISSUES 8% FIVE YEAR GOLD NOTES

The Portland Railway Light and Power Company recently placed on the market an issue of one million dollars in eight per cent five year gold notes, dated March 1, 1921. These notes are the direct obligation of the company and will be issued in one hundred, five hundred and one thousand dollar denominations. The interest will be payable semi-annually. The notes will be callable on any interest date at a premium. An issue of two million dollars has been authorized, only one million dollars of which will be placed on the market at this time.

The money will be expended during 1921 for improvements and betterments necessary to keep pace with the growth of the community. A feature of the sale is that it will be accomplished through the employes of the company, instead of through bond houses as is customary. A special effort will be made to place as much of this paper in the hands of the company's customers as is possible.

GREAT WESTERN POWER 8% GENERAL LIEN BOND ISSUE

Application has been made by the Great Western Power Company to the Railroad Commission for permission to execute a mortgage to secure an issue of $5,000,000 8% general lien bonds dated February 1, 1921 and maturing in 1936, the proceeds of which are to be used for the completion of the Caribou plant and for a transmission line carrying 165,000 volts from the plant to the substation at Valona. The company asked permission to issue the bonds and sell now $2,500,000 of the issue at a price equivalent to 94% of the par value and to hypothecate $2,500,000 of its first and refunding bonds Series "B."

The company shows that the estimated total cost of the Caribou plant and transmission line will be $15,475,300; that the Commission has already provided securities to finance this construction in the amount of $10,847,500 and that there still remains to be provided $4,627,820, hence the application at this time for permission to issue bonds.

MOORHEAD LABORATORIES CLOSES IMPORTANT CONTRACT

Moorhead Laboratories Company of San Francisco, which operates the largest factory in the world devoted exclusively to the manufacture of vacuum tubes, has closed an important contract with the Radio Corporation of America (Marconi), the General Electric Company and the American Telephone & Telegraph Company, granting a patent license under the Fleming valve and DeForest audion patents.

Since the reorganization and reopening of the Moorhead Laboratories in April, 1920, this San Francisco concern has made several important contributions to the advancement of the radio art. These developments include a new type of radio detector, known as the electron relay, of which many thousands have been sold to the United States Government and to amateur radio operators throughout the country, and an improved transmitter tube.

PACIFIC COAST SECTION, N. E. L. A. CONVENTION

The annual convention of the Pacific Coast Section of the N. E. L. A. will be held at the Hotel Del Monte, Del Monte, Cal., on May 25, 26 and 27. Partial programs for the divisional meeting have been prepared. The technical committee will present the following papers: "Power Necessities and Resources of California," by P. M. Downing; "Factors Affecting Fixing of Rates Based on Power Factor," by J. P. Jollyman; "Relay Problems in Large Interconnected Systems," by E. R. Stauffacher; "Progress in the Development of 200,000-volt Transmission," by J. A. Koontz; "Operating Difficulties from the Viewpoint of Load Dispatchers," by F. R. George. The commercial committee will present the following papers: "The Electric Range and Water Heating," "The Convenience Outlet," "Illumination," "Industrial Heating," and "Meeting the Demand for Retail Salespeople."

The following financial statement of the Pacific Coast section was given out by the treasurer on February 1.

Received from previous treasurer			$ 2182.64
Received from National Electric Light Association			2500.00
Received from National Electric Light Association			1500.00
Received from National Electric Light Association			4000.00
			10,182.64
Expenses:			
Travelling expenses	$745.04		
Rent	159.00		
Salaries	742.50		
Telephone and Telegraph	62.34		
Office Furniture and Supplies	606.41		
Miscellaneous	55.09		2370.38
			7,812.26
Bills due:			
Central Stations: last term	$750.00		
Central Stations: this term	950.00	1700.00	
N. E. L. A. (500 Bulletins)	$75.00		
Printing of Electrifier	70.00		
Printing and Stationery	48.50		
Telephone and January office inc.	12.74	206.24	
		1906.24	1906.24
Balance			$5,905.02

POWER COMPANY PLANS TO INCREASE ITS CAPITAL STOCK

At a special meeting of the stockholders of the San Joaquin Light & Power Corporation, to be held at the offices of the corporation in Los Angeles February 24, it is planned to vote an increase in the capital of the company from $25,000,000 to $150,000,000.

This increase in the capitalization of the San Joaquin company is made necessary to carry on the extensive development work in prospect during the coming year, and for many more years to come. Of the original $25,000,000 stock in the company, it is expected that the balance unsold will not be sufficient to meet the demands of the corporation for the current year. By increasing the capitalization to $150,000,000, it is hoped to provide a financial structure sufficiently flexible to meet varying money markets so as to insure getting money necessary for the future development of the company's property, at the most economical rates of interest.

During the past year the power company has expended between $6,000,000 and $7,000,000 in the completion of the Kerckhoff power plant and the Bakersfield natural gas burning steam plant, more than doubling the installed capacity of the system.

The money derived from the sale of the proposed stock issues covered by the increased capitalization will be used in construction of the great Kings river project and in completion of the new natural gas burning steam plant at Buttonwillow, and for the vast network of distributing lines necessary to the development of the San Joaquin valley.

A. S. M. E. BRANCH TO BE ESTABLISHED IN SPOKANE

Authority has been received from the headquarters of the American Society of Mechanical Engineers to establish a local section of that society in Spokane. The organization will probably be effected in the near future.

NEW YORK AND SAN FRANCISCO ADVERTISING COMPANIES CONSOLIDATE, WITH OFFICES IN BOTH CITIES

Incorporation papers filed with the Commissioner of Corporations of California for a charter incorporating the company of Evans & Barnhill. This corporation will carry on the advertising business formerly conducted under the name of the Eberhard Advertising Agency and will also operate for the San Francisco clients of Evans & Barnhill, Inc., New York City.

By reason of this consolidation, the strength of the two businesses combined and represented by both companies, will be directed into one effort.

SEATTLE CHAMBER OF COMMERCE ASKS FOR INVESTIGATION OF SKAGIT DEVELOPMENT COST

The bureau of taxation of the Chamber of Commerce of Seattle, recently reported to the trustees of that organization that the cost of the initial development of the Skagit river power site should be determined as definitely as possible, before the city proceeds further with the project.

It was said, however, that the adoption of the report should not be construed either as approval or condemnation of the Skagit River development, and Daniel B. Trefethen, chairman of the governing board of the civic bureau, announced that a special committee headed by Thomas M. Askren is making an investigation, aided by expert engineering and accounting opinion, to report to the chamber membership at an open meeting, at which time both friends and opponents of the Skagit River project will have equal chance to voice their beliefs.

The report said in part:

"The outcome of the proposed Skagit development is so important to the future welfare of Seattle that we believe the city cannot afford to take chances. If the power can be delivered in Seattle at a low cost, it will give impetus to the industrial development of the city. If the cost is excessive, the project will saddle a heavy burden of debt upon the light utility which would probably have to be met by the taxpayers.

"The original estimate of cost of the Gorge Creek power delivered in Seattle was $5,500,000, the amount of the utility bond issue approved by the voters for that purpose. Uhden, the engineer in charge of construction, recently told the Members' Council of the chamber that the estimated cost is now $9,700,000. Councilman Thomson states that the cost is likely to run to $15,000,000. The latter estimate suggests that the development may cost so much that it will be impossible to market the power produced in competition with the power of private corporations excepting at a loss to be made up by higher charges against light users or by taxation."

STATE HIGHWAY FAILURE IS SUBJECT OF DISCUSSION IN CALIFORNIA

Due to the frequency of the failure of the paved highways in California in the past two years, and the consequent criticism of the state highway standards and construction methods, the board of directors of the California State Automobile Association and the Automobile Club of Southern California decided to institute an engineering and economic study of all of the paved state highways to determine their present condition, their sufficiency in width and their adequacy to carry the ever increasing volume of weight and of traffic. Engineers were retained and the results of their studies, extending over a period of six months, have recently been issued in the form of a report, to each of the societies.

The criticism directed at the state highway procedure is very fair and on the whole constructive. It also furnishes valuable data and material in highway construction research. Since these reports have been filed, the California State Highway Commission have issued a paper in which the reports are discussed and commented upon, and in which the attitude and actions of the Commission are explained.

EFFECT OF HUMIDITY ON EVAPORATION

A Letter to the Editor

Editor Journal of Electricity,

Dear Sir: I was much interested in an article by C. E. Grunsky, in your issue of January 1, 1921, entitled "Figuring Evaporation from Temperature Records." This article seems to be very timely and covers a most important subject for all hydraulic power purposes depending on water storage.

I would like, however, to submit certain constructive criticisms which I believe should be covered in future experiments in order to make such data of real value.

I notice that in all of Mr. Grunsky's experiments apparently the evaporation pans were of an area of 9 square feet. This relatively small area would seem to me to offer some serious difficulties in obtaining accurate data and I am of the belief that if these experiments had been made with greater areas it would have been found that wind velocities and humidity had considerable to do with the results. It is almost inconceivable to me that humidity is not a very important factor in evaporation from the ordinary common-sense laws of physics.

My suggestions for tests of this kind would be actually to build an artificial pond, enclosed by a housing with glass roof, then by thermostatic control, control the temperatures, humidity, artificial wind velocities and temperatures of the water, and make a series of tests such as the United States Bureau of Standards would undertake, creating all the conditions artificially.

I believe such a test would give a very much more valuable record than open air pan tests, because under this condition we could obtain any artificial condition of the atmosphere that we desired and draw correct conclusions from the same. Tests carried on in this way would be extremely valuable and would probably not require as long a time interval to get results.

Very truly yours,

PHILIP D. JENNINGS,
Assistant Engineer.

AN APPRECIATION

The thirty-fifth anniversary of the Journal of Electricity and Western Industry has called forth congratulatory letters and telegrams to the extent of something over two hundred. Many of these come from our most distinguished engineers, scientists, educators, and business executives throughout the nation. Ten or twelve of these have been published on other pages of this issue. While these letters have come to the editor in a personal capacity, they have been published with the viewpoint that the commendation is meant to include not only the work of the editor but the effort of all of the workers on Journal of Electricity and Western Industry, now totaling over forty-two in number. Particularly should they in justice to constructive effort that has been displayed include Harry Gardiner, business manager, whose sound business judgment has done so much in forwarding our work; Emmet Britton, managing editor, able and tireless worker; Clotilde Grunsky and Doris Estcourt, brilliant young women writers, whose efforts permeate so much of the editorial writings in our columns.

ROBERT SIBLEY,
President and Editor.

Meeting Notices for Electrical Men

(The tour of L. W. Davis, special representative of the National Contractor-Dealers' Association, has occupied the attention of members of that body throughout the West. The western trip of E. S. Carman has been the principal item of interest to the engineering fraternity.—The Editor.)

National Representative Talks to Contractor-Dealers at Salt Lake City

Laurence W. Davis, special representative of the National Contractor-Dealers' Association, was the principal speaker at a meeting of the local Contractor-Dealers' Association at Salt Lake City on the evening of January 19. In addition to the members of the Salt Lake City organization, a number of others interested in the electrical industry were present.

Mr. Davis told what other sections of the Association in various parts of the country are accomplishing by keeping in closer touch with the national body. He outlined proper merchandising methods, and showed how satisfactory profits could be made when the proper methods of handling the business in general were followed.

That the welfare of the contractor-dealer, and in fact, of everybody in the industry, depends upon the success and progress of the central station, was clearly pointed out by Mr. Davis, and he urged that a spirit of cooperation and goodfellowship among all branches of the industry should prevail for the mutual benefit of all concerned.

He particularly emphasized the necessity of everybody in the industry giving their hearty support to the cooperative movement which has just been launched in Salt Lake City through the organization of the Rocky Mountain Electrical Cooperative League, and in this connection pointed out that the convenience outlet campaign should be one of the most important activities of the League. The benefits of the convenience outlet, to the public and to the electrical industry, were clearly set forth, and the speaker declared that the success of the idea depends to a considerable extent on its being properly presented and explained to the public.

Mr. Davis made a very comprehensive analysis of items of overhead in carrying on the business of a contractor-dealer, and pointed out the advantages of making a close study of this phase of the game. Proper buying, a careful, vigorous collection system, and a good accounting system, he declared, were very essential for the success of the contractor-dealer in business.

Before the close of the meeting several individual members of the local Contractor-Dealers' Association made application for membership in the National Association.

Contractor-Dealer Meeting in Seattle

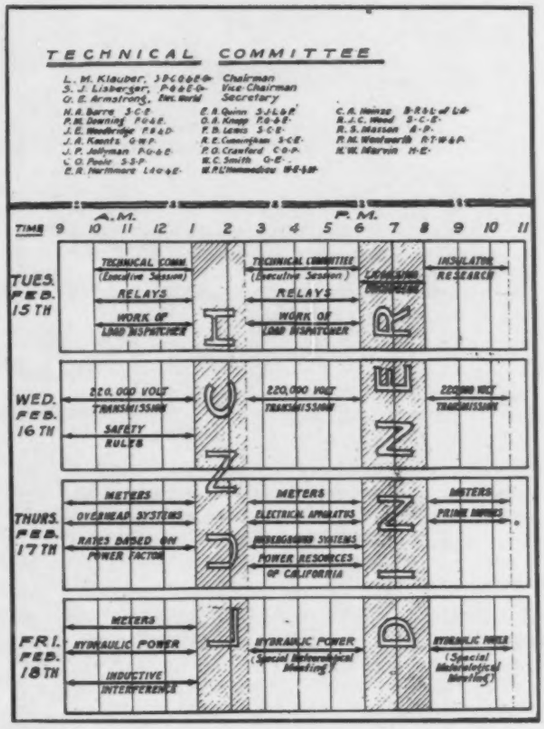
Laurence W. Davis, field representative of the National Electrical Contractors and Dealers' Association, on January 28 addressed the Seattle electrical fraternity at a well attended meeting held in the Masonic Club rooms, Arcade Building. A majority of those in attendance were electrical contractors and dealers.

Pit River Development Is Described

The waterpower development of the Pit river by the Pacific Gas and Electric Company, formed the basis of a paper presented by A. H. Markwart before the San Francisco section of the A. I. E. E. on January 28.

The Pit river has several unique characteristics, and is remarkable for its natural regulation, this being brought about by the existence of many springs and subterranean flows originating in underground reservoirs occurring in the porous areas of Fall river, Hat and Burney creeks.

Mr. Markwart illustrated his talk with several charts, including load curves covering several years, maps of the territory under discussion, and data on the annual run-off and storage estimates.



Schedule of the meetings of the Technical Committee of the Pacific Coast Geographical section of the National Electric Light Association, held in San Francisco, February 15-18.

Western Electric Company Holds Semi-Annual Sales Convention at Salt Lake City

The semi-annual conference of Western Electric Company salesmen in the territory for which Salt Lake City is headquarters, was held in that city on January 20, 21 and 22. Present and past selling conditions were brought before the meetings, and better sales conditions were predicted for the near future.

James S. Walker, Jr., president of the Salt Lake Electrical Contractor-Dealers' Association, spoke before the meeting on the 21st, and in the evening a dinner was given at the Newhouse Hotel.

Talks were also given by C. H. Talmage, manager of the Salt Lake City branch, and by several manufacturers' representatives, in addition to the general discussion and exchange of ideas which was participated in by all present.

Irrigation Men of Utah Meet for Discussion of Vital Problems

The Utah Irrigation and Drainage congress held its fourth annual convention in Salt Lake City on January 17th and 18th. In attendance were approximately 100 representative men who know the science of irrigation as their daily work, including experts in the development of the projects that have reclaimed a large part of the West.

Most of the speakers brought home the fact that progress and development of Utah and of all the Western states depended to a considerable extent upon the solution of irrigation problems.

Resolutions adopted by the congress, and proposed legislation recommended affecting irrigation and drainage in Utah, are summed up as follows:

Approving the Smith-Fletcher bill and urging its early passage by Congress.

Endorsing the request of the director of the United States Geological Survey for an increase in the appropriation for stream gauging.

Endorsing the federal farm loan act, and respectfully requesting a speedy decision from the United States Supreme Court in which its constitutionality is now under question.

Requesting President-elect Harding to appoint a citizen of one of the arid states to the position of Secretary of the Interior.

Urging the Utah legislature to such action as will provide for cooperation between the state and the United States government in a detailed survey and investigation of the Green river irrigation project.

E. N. Britton Addresses Rocky Mountain League at Salt Lake City

That the recently organized Rocky Mountain Electrical Cooperative League can and should be an important factor in the development of the industrial West, was the statement of Emmet N. Britton, managing editor of Journal of Electricity and Western Industry, in an address at Salt Lake City recently before the members of that organization and of the electrical industry in general; and he proceeded to point out, in a convincing manner, the necessity of cooperation between the four branches of the industry.

"The future growth of the West lies in the development of its enormous water-power resources," said Mr. Britton, "with only about two million horsepower developed up to the present time, and forty million horsepower yet to be developed. This means that we are going to have an industrial West. The raw materials are here, the power supply is here, and the industries and the people will naturally be attracted by these conditions."

Mr. Britton's address carried a stirring appeal for cooperation, an essential factor in the development of our wonderful West, and his audience displayed a spirit of genuine enthusiasm and interest as a result of the clear and convincing manner in which he handled his subject.

Mr. Britton was introduced by J. A. Kahn, general manager of the Capital Electric Company of Salt Lake City, and chairman of the advisory committee of the Rocky Mountain Electrical Cooperative League.

Brief talks were also given by several members of the electrical fraternity of Salt Lake City, among them being C. B. Hawley, general manager of the Intermountain Electric Company; James S. Walker, Jr., of the Walker Electric Supply Company, and president of the Contractor-Dealers' Association; P. M. Parry, commercial manager of the Utah Power & Light Company, and E. H. Eardley, of the Eardley Electric Supply Company. L. A. Herdti, general manager of the Ogden Electric Supply Company, of Ogden, also made a few remarks.

Calkins and Carman Address Development League

Governor John U. Calkins, of the Federal Reserve Bank of the Twelfth District, spoke before the San Francisco Electrical Development League on "Problems and Outlook as Viewed by a Banker," at the weekly meeting on January 31.

Gov. Calkins spoke briefly by way of introduction, on the general aspects of the Federal Reserve System, explained why it was founded, and sketched the work that it had accomplished. He also told how the question of providing a means of elastic credit, which was given little consideration at the inception of the system, had become the principal function.

The two outstanding features of the present industrial situation, according to Gov. Calkins, are the immense quantity of unsold goods in the United States, and the large amount of uncovered European credit. He expressed a belief that an adjustment, and a return to normal was logical and inevitable.

Gov. Calkins was introduced by Dr. Thomas Addison, district manager of the General Electric Company.

At the weekly meeting held on February 7, President E. S. Carman, of the American Society of Mechanical Engineers, spoke on "The Future of the Engineering Profession". Mr. Carman is chief engineer of the Osborn Manufacturing Company, of Cleveland, Ohio, and is an authority on industrial management.

San Francisco Section A. S. M. E. Greets National President

At the February meeting of the San Francisco section of the A. S. M. E., held on February 3, the members of that organization had the honor of meeting the national president of that society, Mr. E. S. Carman, who delivered an address on "Engineering Opportunities in America's World-wide Activities."

Following Mr. Carman Prof. Wm. H. Wright, of Lick Observatory, Mt. Hamilton, California, spoke on the subject of a recently perfected astronomical device for determining the exact dimensions of stellar bodies, the work of Prof. A. A. Michelson of the University of Chicago. Through the courtesy of Dr. W. W. Campbell, Director of Lick Observatory, this wonderful piece of apparatus was portrayed.

Vancouver Contractors Hear Davis

Laurence W. Davis, special representative of the National Association of Electrical Contractors and Dealers, and A. C. McMicken, sales manager of the Portland Railway Light and Power Company, addressed 125 electrical men at dinner in Vancouver on January 31, under the auspices of the British Columbia Electrical Cooperative Association and the Vancouver Association of Contractors and Dealers.

The chair was taken by Mr. W. G. Murrin, assistant general manager of the B. C. Electric Railway Company and vice-president of the Cooperative Association. Mr. McMicken urged cooperation between all branches of the industry and instilled great enthusiasm by describing the progress which had been made in California, Washington, and Oregon.

Mr. Davis, who spent two days in Vancouver, spoke on cost accounting and other phases of contractors and dealers' business. The meeting was one of the most enthusiastic yet held in Vancouver and great good is expected to come to the industry as a result. Later Mr. Davis spent some time in local dealers' premises and was present at a meeting of contractors when some of the difficulties of the local situation were gone into.

COMING EVENTS

PACIFIC COAST SECTION, NATIONAL ELECTRIC LIGHT ASSOCIATION
Annual Convention—Del Monte, California, May 25-27, 1921

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS
Annual Convention—Salt Lake City, Utah, June 20-26, 1921

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS
Mid-Winter Convention—New York, Feb. 16-18, 1921

NATIONAL ELECTRIC LIGHT ASSOCIATION
Annual Convention—Chicago, Ill., May 31-June 1, 1921

NATIONAL TECHNICAL DIVISION, N. E. L. A.
Weather Forecasting Convention—San Francisco, California, February 18, 1921

AMERICAN SOCIETY OF MECHANICAL ENGINEERS
Spring Meeting—Chicago, Illinois, May 23-26, 1921

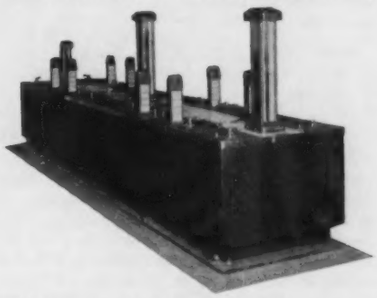
NEW MEXICO ELECTRICAL ASSOCIATION
Annual Convention—Albuquerque, February 14-15, 1921

LATEST IN EVERYTHING ELECTRICAL

(Electrical manufacturers have produced three devices for industrial use which mark recent advancement in engineering. The Lock-Control switchboard is a replica in miniature of the actual Locks. The flow meter, which is an ingenious contrivance, combines two instruments. —The Editor.)

LOCK-CONTROL SWITCHBOARD FOR INDUSTRIAL CANAL

The General Electric Company has just completed a very interesting switchboard to control the locks on a new



Miniature reproductions of locks for convenience in switchboard control.

industrial canal which has been built by the Port Commissions of New Orleans. This canal will eventually connect the Mississippi river with Lake Ponchartrain and provide a shorter route from New Orleans to the Gulf of Mexico, through Lake Boyne.

The control board is somewhat similar in appearance and operation to the famous Panama Canal switchboard, being a duplicate in miniature of the locks themselves, and shows both the position of the lock gates, and the depth of water in the locks. It is also equipped to show the position of all water valves. The marble slabs on top of the board represent the lock chambers with small gates representing the lock gates. The columns show the positions of water valves for each chamber, and also indicate the water levels.

VALLEY ELECTRIC COMPANY MOTOR GENERATOR SETS

Created to fill a demand for a means of charging 110-volt interlocking batteries and other higher voltage and higher discharge systems, the Valley Electric Company of St. Louis, Mo., has put on the market a new a.c. floating battery motor generator set for this purpose. Since these machines employ double self-aligning ball bearings, mounted between heavy filtering pads that retain lubrication for four to six months, it is claimed by the manufacturer that it will give a minimum bearing life of approximately seven years, while the oversize generator commutator is of hard drawn copper and the brushes are also chosen for long life.

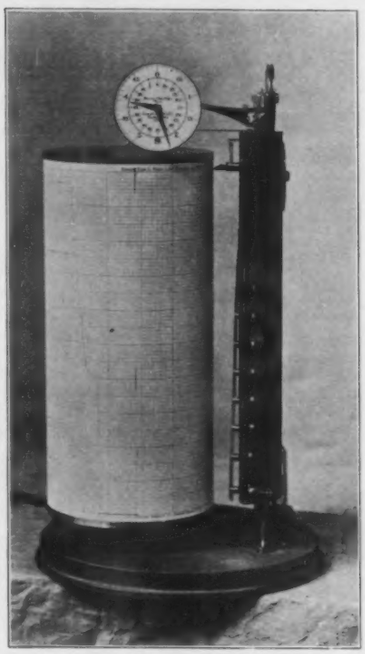
COPPUS TURBO BLOWERS

The new Coppus Turbo Blower which is described in detail in a new catalogue published by that concern, is offered as the last word in turbo blower design. A copy of this fifty-page booklet may be obtained by addressing the home office of the concern at Worcester, Massachusetts.

STEVENS TYPE L WATER LEVEL RECORDER AND FLOW METER

This instrument is in reality two instruments combined. The Recorder is a complete water level recorder in itself designed for small conduits, weirs or other devices where the range of heads does not exceed 2 feet. The Flow Meter is a separate integrating attachment that may be put on at any time.

The purpose of the Flow Meter is to save the labor of computing the volume of flow from the record of water levels. It may be set to record the total volume of water passing the instrument in acre-feet, gallons or any other unit desired.



Operating somewhat on the principle of a planimeter, the above device combines several interesting features.

It is operated by an adjustable spiral cam that may be set for any water, headgate, canal, flume or ditch that is rated, or for any device or condition where the height of water is an index of the flow.

The instrument is manufactured and distributed by Leupold Voelpel & Co., Portland, Oregon.

AMERICAN STEEL SPLIT PULLEYS

The latest catalog of the American Pulley Company contains not only the description, price and specifications of the different types of pulleys which they manufacture, but also gives a list of more than 250 dealers in different parts of the United States and in foreign countries, who handle their product.

Books and Bulletins

Principles of Electrical Design

By Alfred Still, Professor of Electrical Design, Purdue University. Second edition; 365 pages, 6 x 9, 146 illustrations. Published by the McGraw-Hill Book Company of New York City, and for sale by the Journal of Electricity and Western Industry, San Francisco.

A clear treatment of fundamentals and principles of general application. The text has many distinctive features. The writer is a firm believer in having a concrete mental conception of the hidden actions which produce visible and measurable results, and in studying the electromotive forces developed in the windings of electric generators, he consistently represents the effects as being due to the cutting by the conductors of imaginary magnetic lines.

Storage Batteries

By C. J. Hawks; 157 pages, 6 x 9, published by The Hood Dunwoody Industrial Institute, Minneapolis.

It is the custom of the Dunwoody Institute to develop new courses of instruction largely through evening classes. These courses give extension training to workmen already employed in a trade during the day. Frequently, no text on the market meets the situation and the instructor must prepare his own lesson sheets. In this way, Storage Batteries was developed. The book is calculated to serve the needs of day, part-time and evening classes on storage battery work, and to be of use elsewhere as well.

Allis-Chalmers Bulletin

The latest publication of the Allis-Chalmers Manufacturing Company is Bulletin No. 1113, applying to the single phase repulsion motor, type SAR.

Development of Electricity in the Merchant Marine

Development of Electricity in the Merchant Marine is the title of an attractive 16-page, 8½ x 11 booklet recently published by the Cutler-Hammer Manufacturing Company of Milwaukee and New York, and which tells in a brief and interesting way the story of the evolution of the engine-propelled ship from the historic "Clermont" to the present-day craft propelled by the steam turbine or the Diesel engine. The requirements peculiar to electric control on ships are briefly discussed, and a description of electric control of auxiliaries on the motorship "Solitaire" will be of interest to men in the marine field. The booklet is illustrated with views taken aboard the "Solitaire," and several controllers are shown as typical of those required for marine work. The booklet is known as Publication 890.

NEW ELECTRICAL DEVELOPMENTS

(The establishment and erection of buildings of business enterprises would seem to be general throughout the Northwest. California company installs radio outfit to facilitate construction work in mountains. Several applications to permit filing on power sites have been made through the Southwest and Intermountain districts.—The Editor.)

THE PACIFIC NORTHWEST

PORTLAND, ORE.—Bids have been called for on the construction of the proposed new $700,000 home of the Elks lodge in this city.

PE ELL, WASH.—The Pe Ell Light & Power Company has been capitalized for $10,000 by C. E. McCoy and E. Snelling, to handle electrical supplies and to manufacture and sell electricity.

SPOKANE, WASH.—The manufacture of a patented bath chair for babies will be begun in the near future by the Baby Bathing Supply Company, recently authorized to issue bonds to the amount of $100,000.

SALEM, ORE.—Five additional extensions to the Portland Railway Light & Power Company lines in Salem and vicinity to supply farmers with electric light and power, have recently been built. These five extensions total a length of about 3.8 miles.

TACOMA, WASH. — For the second time within six weeks, the board of Pierce County Commissioners refused all offers for $250,000 in general utility bonds. The first advertisement was sent out six weeks ago, but bids received at that time were unsatisfactory.

VANCOUVER, WASH.—Claiming that the installation of a modern style of street illumination is essential, members of the Realty Board passed a resolution favoring the proposed installation of cluster lights and appointed a committee to present the matter to the next meeting of the city council.

PORTLAND, ORE.—Plans are being formulated for the construction work on the proposed edifice to be built for the First Christian church on the site owned by the church covering the 100 x 100-foot corner at the northeast corner of Park and Columbia streets. The structure will cost between $80,000 and $90,000.

CENTRALIA, WASH.—Recently the city commission gave final reading to an ordinance providing for the installation of an ornamental lighting system covering the business district of the town. The estimated cost of the improvement is placed at $22,000. It is reported that bids will be called for during February.

PORTLAND, ORE.—A warehouse estimated to cost $10,000 will be constructed by the Palmolive Company, according to Manager E. N. Lingelbach. This will be the first unit of a building which will eventually be three times the size. The building will cover a square block, on the site of the old factory of the Palmolive Company.

ASTORIA, ORE.—Creation of a factory center at Youngs River Falls, construction of pulp mills in that section, the connecting up of three railroads and the establishment of regular service to open up that district in Clatsop county are features contained in tentative plans which have been outlined by the Crown Willamette Paper Company.

ROSEBURG, ORE.—A complete reorganization of the Douglas County Light and Water Company has been effected, and S. A. Kendall takes over the underlying bonds which came due last September, forestalling any action to bring the company into the hands of a receiver. Wm. Pollman, who formerly held a large financial interest, has resigned his holdings and retired from the company. Mr. John Kiernan has retained his interest and has been elected president.

SOUTH BEND, WASH.—Attracted here by excellent water and rail facilities and the close proximity of choice timber of all kinds, H. Wohlfarth, furniture manufacturer of Tacoma, has purchased the Loomis building and equipment, and has announced his intention to establish a plant here for the production of high-grade furniture of all kinds.

OLYMPIA, WASH.—Provided the Oregon legislature makes similar provision, the Washington legislature was asked in a resolution recently to appoint a committee to investigate the proposition of building a bridge across the Columbia in the vicinity of Cathlamet. The resolution also asks that an investigation be made of the feasibility of other bridge locations.

TACOMA, WASH.—The city of Tacoma has secured deeds to 6,000 of the 7,000 acres of land needed by the city for the development of the Lake Cushman power site. Completion of the deal must wait upon the trial of the condemnation case of the city, set for June 1st, but the city now has absolute title to the greater part of the lands and water rights needed.

PRINCE RUPERT, B. C.—Plans for a $6,000,000 pulp and paper mill at this point are now practically completed. The plant will be one of the most modern in Canada and will employ about 1000 men. Three kinds of paper can be made, including the finest bond. The plant will cover a space of about 200 acres. Canadian and United States capital are behind the project.

ELLENSBURG, WASH.—The Kittitas Light & Power Company of Ellensburg recently filed articles of incorporation, naming a capitalization of $36,000. Incorporators are: Eugene E. Wager, John O. Sorenson, R. A. Lynch, M. Schorman and Leslie Wilson. The purpose of the company, according to the incorporation papers, is to establish electrical plants and deal in electricity.

CHEHALIS, WASH.—Suit against the Washington-Idaho Water, Light & Power Company was recently instituted in the Superior Court of Lewis county by D. G. Lobb and J. Harris, for $52,000, alleging non-payment on the contract for moving an electric power plant from Clarkston, Wash., and installing it at Centralia. A. Welch of Portland is one of the principal owners of the light company.

SPOKANE, WASH.—The Washington Water Power Company recently petitioned the Idaho Public Utilities Commission for the right to construct power transmission lines to the city limits of the town of St. Maries, Idaho. The town is now served by the Milwaukee Lumber Company but the contract for service expires August 1, 1921. If the petition for the extension is granted, the Washington Water Power Company will construct a transmission line from the Kootenai-Benewch county line along the St. Joe river to St. Maries.

KELSO, WASH. — According to an official statement received from the offices of the Long-Bell Lumber Co. of Kansas City, Mo., this company will erect a huge mill and lumber manufacturing plant on the Cowlitz river at Kelso, Washington, the plant to have a daily capacity of 1,000,000 feet. The proposed plant will be electrically driven throughout. Recently the Long-Bell Company closed a deal for 2,500 acres of timber land in this vicinity and early in 1920 the same concern purchased 40,000 acres of choice timber in Cowlitz and Lewis counties from the Weyerhaeuser Timber Company.

THE PACIFIC CENTRAL DISTRICT

FRESNO, CAL.—The radio stations recently installed by the San Joaquin Light & Power Corporation at Fresno and Kern River canyon have proven a great success. These stations are the first to be installed by any of the power companies of California.

MONTAGUE, CAL.—R. E. Swigart, trustee of the Klamath-Shasta Valley Irrigation project at this place, has been granted permission to divert 1,600,000 acre-ft. of water from the Klamath River for storage purposes. Plans also include the development of 110,000 hp.

FRESNO, CAL.—The Fresno Traction Company has announced that they will add $84,000 in equipment to their lines in this city. The money will be expended in new cars. At the same time it is intimated that the company may request an increase of fare from the State Railroad Commission.

VALLEJO, CAL.—The new steel barge for use at the San Diego aviation station has been launched at Mare Island. The barge is the first of its type to have electric welded plates and the outcome of the tests with the barge will be awaited with much interest by the hull department officers of the navy.

OROVILLE, CAL.—The contract for 400,000 feet of lumber to be used in building its new lumber mill here has been let by O. C. Griffiths of the Hutchinson Lumber Company to the Charles K. Spaulding Company. A spur track must be built from the Western Pacific track to the mill site before building operations can start.

RED BLUFF, CAL.—Plans for a municipal lighting system were launched at a meeting of the city council, which has requested the Pacific Gas & Electric Company to submit a price on its present system. The first block of $150,000 municipal water bonds, $95,000, has been sold to the National City Company. The city took over the water system February 1.

SAN FRANCISCO, CAL.—Prospects for the sale of the Sacramento-Northern Railroad to the Western Pacific have brightened as the result of an advance in the bid of the Western Pacific. The new bid, $5,250,000, has been sent to the stockholders of the valley electric line through the First Federal Trust Company, which is acting as the agent for the Western Pacific in the transaction.

REDDING, CAL.—The Pacific Gas and Electric Company has petitioned the State Railroad Commission for a rehearing of the company's case with Redding. On January 14, the Commission decided that $49,800 was a fair value for Redding to pay the Pacific Gas and Electric Company for its electrical distribution system in this city. That was the second hearing. Now the company wants a third hearing.

SACRAMENTO, CAL.—Representatives of a large number of towns and cities in Superior California met in this city for a two-days' conference on the question of municipal power development. The meeting was called by Commissioner of Public Health and Safety Charles A. Bliss. The conference was decided upon at the recent convention of the California League of Municipalities in Chico when the question of municipal power plants was the subject of considerable discussion.

THE PACIFIC SOUTHWEST

CALEXICO, CAL.—The city council is considering the installation of a municipal light plant. M. L. Parcels and A. C. Baskin were appointed to investigate the cost, etc.

ARROWHEAD SPRINGS, CAL.—Plans have been prepared for the erection of a power house and portable buildings to cost about $60,000, at the Public Health Hospital at this place.

PHOENIX, ARIZ.—Plans for rebuilding of the Warren Grove dam in Yavapai county, which was washed out 31 years ago, have been perfected and construction work will begin within a short time.

LOS ANGELES, CAL.—The city engineer has been instructed to prepare an ordinance providing for the installation of an ornamental street-lighting system on Ogden Street between Sunset and Hollywood Boulevards.

SOUTH PASADENA, CAL.—A meeting of technical men of Pasadena was held at the Pasadena Chamber of Commerce, and steps taken toward the organization of a permanent society of engineers that will take active part in solving the water problem of this territory.

SANTA BARBARA, CAL.—An appropriation of $130,000 for a new lighthouse at this place has been recommended by the Rivers and Harbors Committee of Congress and indorsed by the Navy Department. Plans also include the erection of a wireless station and the installation of new island lights.

SELIGMAN, ARIZ.—E. L. Beyard of this place has applied to the Federal Power Commission for permission to develop 480,000 hp. on the Colorado River, Mojave county. This project will include the electrification of 500 miles of the Atchison, Topeka & Santa Fe Railway system and the irrigation of 500,000 acres of desert land.

LOS ANGELES, CAL.—The Los Angeles Gas & Electric Corporation plans to expend between $4,000,000 and $5,000,000 to enlarge production plants and extend its distribution system. The company has applied to the Railroad Commission for permission to issue $1,000,000 toward the development of this work. Estimates are now being prepared by engineers.

ROSWELL, N. M.—Foreclosure proceedings have been filed in the Federal court at Santa Fe against the Roswell Gas & Electric Company by the Guaranty Title and Trust Company, of New York, and Harold T. Clark, trustee. The papers have just been served on C. M. Einhart, manager of the plant here. The action is based on the fact that the company has not paid its bond interest for two years.

MEXICO CITY, MEX.—Water and lights were rationed to Mexico City beginning the week of Feb. 4th, because of a shortage at the power plant at Necaxa, due to the abnormally dry season. Water is permitted only a few hours during the day and is entirely cut off at night. All unnecessary street lights and electric advertisements have been ordered darkened and the use of electricity for household needs is limited.

FORT WORTH, TEX.—Inside electrical workers of Fort Worth voted to accept the proposition of employers to settle their wage demands by an advance of 50 cents a day. The increase asked was $1.50 a day and double time for overtime. Double time for overtime after 10 o'clock was granted in the proposition of the employers. The new scale will be effective until Dec. 31, 1921. It also provides for double time on holidays.

MESA, ARIZ.—Twenty-four new high-powered electric lights were turned on in the four alleys in the business section of Mesa, and will be lighted continually during all the dark hours in the near future as an aid to the night officers in their patrol work. The electrical lines and wiring in all the business section have been entirely remodeled during the past six weeks, and a complete new line and new poles have been installed.

RIVERSIDE, CAL.—Plans are under way for the expenditure of several hundred thousand dollars for permanent buildings at the March Field, which is being considered by the Chief of Air Service.

EL CENTRO, CAL.—Directors of the Imperial Irrigation District have instructed the secretary to communicate with the Department of the Interior and voice the objections of the board against the Colorado River power application of the Southern California Edison Company being granted by the Federal Power Commission. This decision followed the reading of a letter from A. P. Davis, United States reclamation director, in which he sent a copy of the application. The application is not satisfactory to the local board.

THE INTER-MOUNTAIN DISTRICT

IDAHO FALLS, IDA.—The city council will be petitioned to take steps in securing a lighting system for C Street.

LEVAN, UTAH.—The town council contemplates an election soon for the purpose of submitting to the voters a proposition to issue bonds for the erection of a municipal light plant.

LARAMIE, WYO.—The Midwest Refining Company contemplates the installation of one 500-kva., 2,300-volt, 60-cycle, steam-driven turbine, three 125-hp. motors for water pumping and one 100-hp. motor for boiler feed. J. F. Cullen is superintendent.

BOISE, IDAHO.—The reclamation service has awarded two contracts for electrical equipment for the power plant on the Shoshone irrigation project, one to the Westinghouse Company for $44,500, and the other to the Wellman-Seaver-Morgan Company of Cleveland for $32,500.

COLORADO SPRINGS, COLO.—A project which will furnish electricity for five eastern Colorado towns adjacent to Colorado Springs has been set going by a new corporation known as the Farmers' Electric Light, Power and Coal Company. The company is incorporated for $100,000.

SALT LAKE CITY, UTAH.—Announcement has been made by officials of the Utah Power and Light Company of the filing of a preliminary application providing for the construction of four additional power plants on the Bear river. The new plants will give the company 21,500 added horsepower.

GREAT FALLS, MONT.—Consolidation under the name of the Monarch Lumber Company of more than a hundred retail lumber yards in Montana operated by the Rogers-Templeton Lumber Company, the Goodridge Call Lumber Company and the Libby Yards Company was announced recently. Headquarters will be in Great Falls.

POCATELLO, IDA.—The Idaho Association of Electrical Contractor-Dealers was organized recently at a meeting of fifteen representatives of electrical firms in southeastern Idaho. Harvey Ball, of Burley, Idaho, was made president of the temporary organization. Another meeting will be held at Twin Falls, Idaho, February 20th to effect a permanent organization.

BUTTE, MONT.—The Anaconda Copper Mining Company announced that because of the accumulation of large stocks of zinc it is forced to close its zinc operations. The zinc concentrator at Anaconda and the zinc refinery at Great Falls will also be closed by the Anaconda company. In all 700 men will be thrown out of work, and of these 400 are located at Great Falls.

COLORADO SPRINGS, COLO.—Laboratory work in industrial electricity has begun at the government vocational training school in the DeGraff building under the direction of John L. Sherwin of Denver, a graduate of the College of Mechanical Engineering at Cornell University. Arrangements for the practical work were made as the result of a large demand on the part of the ex-service men for such training.

DENVER, COLO.—Figures secured from the records of the Denver Gas & Electric Light Co. are probably the best indication of the progress and prosperity of Denver during the year 1920. The company gained more than 7,000 new customers during the 12 months just ended, and now supplies gas and electric service to practically every individual in Denver through 103,210 meters.

SANTA PAULA, CAL.—The Southern California Edison Company has applied to the Railroad Commission for a certificate, declaring that public convenience and necessity require the exercise by the company of its franchise to construct, operate and maintain an electric distributing and transmission system in this city. The franchise was granted on December 6, 1920, by the city trustees of this city for a period of fifty years.

POCATELLO, IDA.—The Oregon Short Line Railroad Company has announced the purchase of fifty acres of land north of the state highway north of Pocatello for the immediate erection of a $275,000 timber-treating plant by the railroad. Construction will begin as soon as the weather will permit. The plant will be used to treat ties and other wood material used by the railroad. More than fifty men will be employed by the railroad in the new plant.

MYTON, UTAH.—The Uintah canyon plant of the Uintah Power & Light Company was put in operation January 9th and is now supplying service to about 400 customers. The new plant will develop 800 horsepower, as compared with 125 horsepower capacity of the old Lakefork plant. With the addition of another generator and water wheel there can be 800 more horsepower developed in Uintah basin. The company has a filing on the Uintah river that will develop yet another 4,000 horsepower.

BOISE, IDA.—The Carey Valley Reservoir Company, engaged in installing the Carey irrigation project in Blaine county, has been successfully financed. Heber Q. Hale, president of the company, states that he has raised the necessary $200,000 to complete the work through the negotiating of securities of the company with financiers. Work on the project has been in progress for two years. About $300,000 has been spent in the construction. A dam of concrete and steel is being built. It is of multiple-arch type, and one of the finest of its kind constructed in the West.

OGDEN, UTAH.—At a meeting of the city commissioners on January 31st steps were taken, upon the recommendation of the city engineer, for adding to the water supply of Ogden. It was recommended that $300,000 be set aside for the development of the Skull creek dam site and reservoir in South Fork canyon. The bonding of the city for $300,000 will be one of the propositions submitted to the people of Ogden at the bond election to be held the latter part of February. It will cover the cost of building a masonry dam, reservoir construction and pipe line to connect the city water supply at the artesian wells in Ogden valley.

PAYSON, UTAH.—Water users under the Strawberry project, which is at present operated by the United States Government, unanimously endorsed the taking over of the project from the government, at the annual meeting of the Strawberry High Line Canal Company, held January 18th. The company has already begun negotiating with the government for the purchase of all its rights in the project, which include the power plant in Spanish Fork canyon, transmission lines, distribution system, etc. The grazing lands apportioned to the project have all been secured from the government. Part of this acreage has been leased to grazers of Wasatch county while the remainder is being reserved for the water users of the company.

Petty pilfering is becoming a great annoyance in foreign trade, judging by the following complaint quoted from a commercial contemporary:

Experiments made by shippers on both sides of the world have proved that organized parties are at work, and that they seek much bigger game than the few bottles of beer, or the pair of boots which used to comprise the booty of the petty pilferer of ships' cargoes. From a South African port during the month shippers were notified that among the pilfered freight from a liner calling at Cape Town was an elephant which had not been recovered when the last mail left Cape Town.

We wonder if the port authorities searched incoming passengers thoroughly. We have heard of people smuggling things in the heels of their shoes, and in all sorts of unexpected places.

* * *

Agriculture is not what it used to be. From a contemporary we quote the following remarkable item:

"The pears were examined and pronounced decidedly decayed. Rather than trust having them in court a photograph was taken which depicts everything but the odor.

"About 6,000 stars are visible to the naked eye."

We recommend the investigators to consult Mr. Luther Burbank.

* * *

Safety first has always been one of our slogans, consequently the following heading in an electrical magazine caught our eye:

WHAT IS THE BEST WAY TO PREVENT FURTHER BATHROOM FATALITIES?

May we suggest washing under the pump?

* * *

A versatile public utility has just been brought to our attention by the following clipping from a small town paper:

A new company has made an appearance in the field for the business of lighting, heating and furnishing "juice" for all purposes. They will put in a bid on lighting the city this year, and furnishing "justice" for all mining operations.

We shall watch with interest this venture of an electrical company into the judicial field.

* * *

Modern weapons of destruction are increasing at such a rate that we find it impossible to keep up to date. Consequently we got an unpleasant, mystified thrill on reading in a daily newspaper recently that "somewhere in the bay region is a burglar nursing a buttel wound inflicted by Mrs. —— of Alameda."

* * *

Electrifying the farm may be a worthy aim, but it behooves us to walk warily lest we run into something like the following letter, received by a publishing company in response to a questionnaire sent out regarding coal oil stoves:

"Dear Madam:

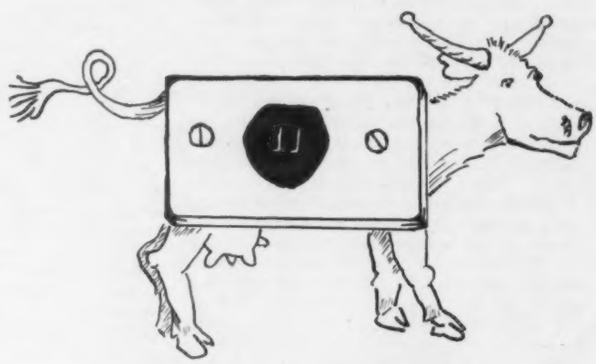
"Your favor, asking various questions, is duly received. I think I shall answer them in my own way. I am pleased to realize that you, living in an age of electricity, are inclined to sympathize with us outer barbarians, of whom you confess you are ignorant, and conceive of us as still living in the age of coal oil stoves, etc. As a matter of fact, water runs down hill here, very much as it does in New England, and a group of gentlemen, observing that phenomenon, assumed that it might generate electricity as with you, and so installed a plant, with the result that we farmers also light our homes, cook our meals, wash, iron, churn, grind our grain, pump water and milk cows by electrical power, very much as doubtless your farmers do, although I have noticed a great many who do not when visiting at the home of my ancestors in Bristol, in the state of Rhode Island, which lies a little to the south of Massachusetts.

"Some of us also read on occasion. This farm subscribes for about a dozen periodicals, and two daily newspapers are left at our door about as early as The Transcript finds its way to your doorways mornings. Almost any county in this state could supply more blooded stock than the whole of Massachusetts. I do not believe there is a farmer in this county who does not own from one to two or three automobiles. Most of us see a good deal of the country. This family has just made a little run of 1,400 miles through Colorado points, and is inclined to think it will visit your part of the country next summer. However, traveling in New England becomes each year more and more difficult, as we do not understand Canadian French, Portuguese, or any of the Slavic languages.

"I regret that the cut at the head of this letter shows our farm buildings, a part of them at least, instead of those of some of our neighbors, as our improvements are somewhat obsolete. I assure you, dear madam, that the Central West is not behind New England. Indeed, I am positive we know much more of our country as a whole than do the denizens of your section. I am well acquainted with the location of King's Chapel, The Granary Burying Ground, Copps Hill, and many other objects which attained historical importance before politicians deemed it necessary to have Gaelic taught in your primary schools and all the Yankees had not emigrated to Kansas. I regret that you people do not travel more in the hinterland of America. You would find it interesting. It is, as my husband says, a h—— of a fine country."

* * *

ELECTRICAL HYBRIDS—VIII



The Electrical Convenience Cowtlet

The Convenience Cowlet's a tractable beast
With a most debonair disposition;
If you work her all day she won't mind in the least,
And she never gives up her position.

She's versatile also, like most of her sex:
A washer, a toaster, a cleaner
She handles with ease; there is nothing will vex
Her at all, or disturb her demeanor.